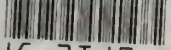



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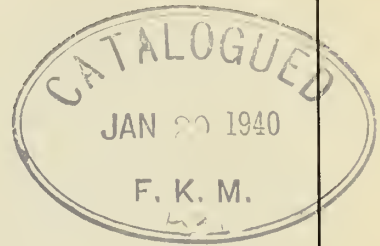
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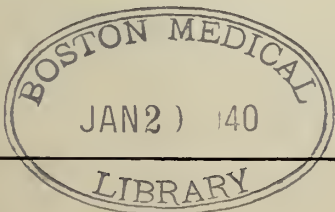
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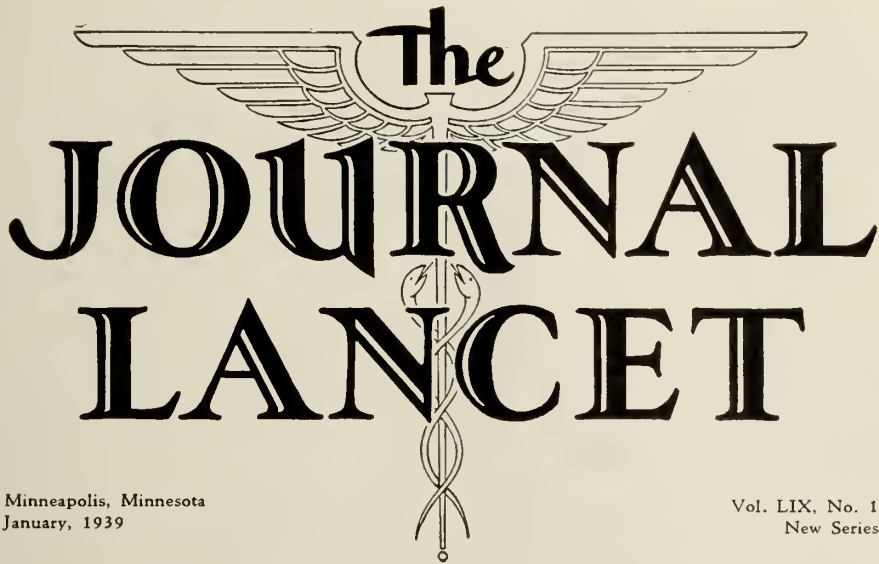
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Foreign Protein in Ocular Therapy*

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THE earliest attempt at non-specific protein in treating ocular diseases was made by Deutschmann in 1907. He inoculated horses with a yeast solution and then used the blood serum from these inoculated animals. The same author reported good results with antidiphtheritic bacillus. Backhoff also reported good results with yeast serum. Von Szily and Sternberg, in 1913, used typhoid vaccine in various eye infections with good results. Kreisbich, in 1913, used gonorrhoeal vaccine in treatment of non-gonorrhoeal iritis with good results. In 1916, Von Miller and Thanner used parenteral injections of milk in the treatment of ocular diseases. From that time on much progress has been made.

The development of this form of therapy probably is an outgrowth of the beneficial effects of intercurrent infection with accompanying fever and chills in several diseases. These benefits are due to the foreign protein shock and the best examples of this therapy in clinical medicine are the malaria treatment of parasyphilis and the insulin shock for schizophrenia. Protein therapy, however, has not advanced as rapidly in other branches of medicine as in ophthalmology, largely because it conflicts with our preconceived ideas regarding bacterial antigens and immunity. Nevertheless, it stands today as one of the most successful agents in the armamentarium of the ophthalmologist and the clinical evidence of its efficiency in many acute types of eye infections cannot be denied.

The mode of action of parenteral administration of non-specific proteins is not clearly understood. Formerly, it was believed to be due to a rise in the body tempera-

ture which is thought to be above the optimum for various organisms. Now, it seems that fever is not believed to be the factor which overcomes the infection, but is usually a part of a group of symptoms following foreign protein injections which has been termed foreign protein shock. This may be summed up by the following remarks of Benedict, "In a series of acute diseases of the eye treated at the clinic, the therapeutic effect was not comparable to the rise in temperature. In some cases, relief of pain followed shortly after the first injection, and diminution of the inflammation was noticeable within a few hours; in none, however, was there any evidence that a rise in temperature hindered or delayed healing."

A leukocytosis, with predominance of the mononuclear cells, is part of the syndrome, and is looked upon as a beneficial sign and indicates an increase in the general body defense. Peterson has shown that a number of tissue ferments are set free which break up bacteria and their toxins into harmless products. He analyzes the whole series of reactions as a stimulation of the body's defensive mechanism to the highest pitch.

SELECTION OF FOREIGN PROTEIN

Those substances which have acquired some popularity are diphtheria antitoxin, normal horse serum, autohemorrhagic serum, casein typhoid and colon vaccines, egg albumin, proteoses, peptones and albumoses. The literature reveals that most of these have been thrown into the discard, and those in favor today are milk, typhoid and diphtheria. From my observations, whole milk and typhoid are favored by most eye men to produce strong reactions. In my experience, milk has proved the most efficacious and practical. It is a standard product and

* Read before the South Dakota Academy of Ophthalmology and Otolaryngology, May 10, 1938.

cheap. Because the foreign protein effect depends on its bacterial content, poorer grades of ordinary cow's milk are more desirable than certified or pasteurized milk. Boiling the milk for three minutes is sufficient to kill the non-spore-bearing ones necessary for shock.

The initial dose is usually from 2 to 5 cc. In infants for the treatment of ophthalmia neonatorum, 1 to 2 cc. may be used safely. Gifford states that this almost always causes a definite reaction with fever of 100° to 103°. In adults, the procedure is to step up the second dose to 8 to 10 cc. Usually, this is given in intervals of two days. Of course, this depends on the reaction, and in critical conditions, the next injection may be given when the patient has been free of fever for 24 hours, or, if the blood count is being followed, when this has returned to normal for the same length of time. After the first few injections, the reactions are usually slight or absent and after four or five injections, if no benefits are derived, one should resort to some other therapy.

The general reaction after parenteral injection of milk is often ushered in by a distinct chill four to eight hours after the initial injection, and begins to wear off from two to three hours later, reaching the normal level within 24 hours. With the subsidence of the chill, or during its later stages, the temperature starts to rise. A maximum, ranging between 101° and 105°, may not be reached within six to eight hours after the injection, or even longer, but a normal level is usually reached again within 24 hours. At times, temperature is accompanied by a chill, more often by sweating and sometimes a headache and backache. With the febrile elevation, the pulse is invariably increased in proportion. A slight rise in blood pressure accompanies the chill, and with its subsidence there is usually profuse sweating. A marked increase in the leucocytes preceded by a short leucopenia is a very striking and important manifestation in these reactions. Polymorphonuclear leucocytes are found to predominate, but an increase in transitional, large mononuclear and eosinophiles appears later.

The focal reaction after injections of foreign protein is the result of protein cleavage products being brought to the focus of infection. This is manifested by a reduction of pain in the eyes, rapid decrease of the bulbar chemosis, swelling of the lids and a rapid decrease in the secretion. The physiological mechanism involved is first a short increase in the inflammatory condition, followed by a period in which the capillaries become less permeable, the fluids diminished and tension and pain lessened; finally restitution occurs. The increased flow of lymph with an increase of antiferments and enzymes resulting from cleavage of the parenteral milk injections, as well as the increase in phagocytosis must necessarily exert a considerable effect on the invading organism and on the removal of its resulting pathological products. The nature of the immunological reaction is not known. One theory regards it to be an antibody mechanism while another, probably with more reason, adheres to the theory of reactions of proteolytic enzymes produced through the cleavage of milk parenterally injected.

Typhoid-paratyphoid vaccine or one of the typhoid antigens is really the old stand-by in this form of ther-

apy. Some patients with acute ocular infections fail to show any protein shock after repeated large doses of milk, and so it is then best as in the more serious conditions, especially sympathetic ophthalmia, to make use of typhoid. These injections are given intravenously and are much less painful than milk injections. It is usually given in 25 to 30 million organisms as an initial dose and this amount will cause fever of 100° to 102° in most patients. This is increased to 40 and 50, 60 or 70 million in later injections depending on the reactions. Correspondingly smaller doses are given for small patients and are never used in infants. The intervals between injections are in general the same as those described for injections of milk.

One of the chief disadvantages of typhoid is the large degree of shock that develops after the use of the whole organism. Brown of Cincinnati made a study of the various typhoid antigens with regard to selecting one that produced the desired antibodies in sufficient quantity without producing too severe shock. From his observations, he discovered that there is an "H" flagellar heat-labile (at 100° C.) antigen; an "O" somatic, heat-stable (at 100° C.) antigen; and a "V-1" antigen which appears to be an indefinite toxic protein. The antibodies formed by the "H" antigen are not sufficient for immunization against typhoid fever, but are, however, potent interfering antibodies in uveal sensitization. It was found that the average adult between 15 and 70 years with reasonably good resistance, could tolerate an intravenous injection of 40 million typhoid "H" antigens without much shock. The average effective dose was found to be 20 to 25 million, repeated every 36 to 48 hours, depending on the individual reaction. If the inflammation was acute and demanded quicker therapy, this dose could usually be repeated every 24 hours.

INDICATIONS FOR USE OF FOREIGN PROTEIN

These are rather broad. In general the best results are obtained in acute infections either of the conjunctiva, cornea or uveal tract. This is especially true in gonorrhoeal ophthalmia. Many have reported their results in gonorrhoeal ophthalmia in adults, but in the new-born there are very few reports. Muller reported the treatment of gonorrhoeal ophthalmia of new-born children in 21 cases with cow's milk. The milk was boiled for two minutes, cooled, and from 1 to 3 cc. injected intraglutally. Locally, argyrol, silver nitrate, or protargol was used. If the patient had a general reaction, the course of the disease was much shorter. Usually after the first injection within four hours, the temperature rises, the serum increases but later decreases and the swelling of the conjunctiva disappears.

The great value of milk in treatment of gonorrhoeal ophthalmia may be summed up by the words of one of our professors in eye: "Until this form of therapy was discovered there had been little added to the treatment of gonorrhoeal infection of the eye in the past 20 years that justified any definite assurance of any good results in any case. The general statistics following this infection show blindness in over 75 per cent. Its normal course with presently applied therapy covers so long a period, that the corneal epithelium is irreparably dam-

aged and followed invariably by scar formation and opacity, or loss of the entire eyeball."

The most common uses for foreign protein in ocular therapy are acute iridocyclitis, choroiditis, optic neuritis and keratitis. In these conditions, it seems to ease the pain and give a feeling of comfort to the patient although he suffers the symptoms of general reaction as headache, chills, malaise and fever. The benefits in these conditions, especially in stubborn cases of uveitis, are sometimes almost spectacular. The severe pain subsides, the congestion begins to disappear and the anterior chamber starts to clear up after the first injection. The ordinary fundamental treatment of ocular infections should not be substituted for protein therapy, but rather aided by it. For instance, mydriatics such as atropine, heat and antiseptics should be used when indicated in inflammatory conditions.

Syphilis and tuberculosis should be eliminated beyond a reasonable doubt. The search for and removal of foci of infection should be diligently carried out. The teeth, tonsils and nasal sinuses are investigated before the genito-urinary and gastro-intestinal tracts.

This therapy is of great help in corneal ulcers. The bad sloughing type that are always such a problem are definitely improved. Brown advocates the paracentesis of the cornea to increase the antigen concentration of the aqueous. He came to these conclusions after some interesting experimentation with corneal ulcers in rabbits. A series of animals were immunized with typhoid until the average titer of the blood was 1:1,000+. An equal number of rats were used as controls. Ulcers were then induced in corneas of each animal by inoculation with a suspension of living staphylococci. Aqueous of the anterior chamber of the right eye of each animal was aspirated to note the effect of the concentration of antibodies in the aqueous on the ulcer in the right eye as compared with the ulcer on the left, on which aspiration was not carried out. Thus he was able to study the effect of different intra-ocular concentrations of typhoid antibodies in the aqueous on the ulcer in the right eye as compared with the ulcer on the left eye, on which aspiration was not carried out. The effect of aspirating aqueous of the right in the control animals was compared with that attained in the immunized animal and in the left eyes of the controls on which aspiration was not carried out. From his findings he arrived at the following conclusions:

(1) The ulcers produced in immunized animals advanced less rapidly, were smaller and left fainter scars than in the controls. (2) Aspiration of aqueous from corneas of immunized animals immediately after introduction of infection prevented or greatly reduced ulceration, whereas definite ulcers became established in the untreated corneas. (3) Aspiration of aqueous from the right corneas of the control animals definitely inhibited the advance of ulcer as compared to ulcers in the corneas of the controls, on which aspiration was not carried out. (4) The ulcers in the corneas of immunized animals on which aspiration was carried out did not, as a rule, become as large or cause as much destruction as those in either eyes of the controls. Also, the eyes of the controls on which aspiration was not carried out advanced more

rapidly, became larger and caused larger and deeper scars.

After the striking results in the above and similar experiments, Brown applied this mode of therapy to human corneal ulcers and reports very gratifying results. He states, however, that the concentrate should be raised as early as possible, that is paracentesis should be first done about 36 hours after one or two doses of typhoid are given. He further states that in all the rabbit and human corneas so treated the wound closed at once without any particular local disturbance even in the presence of large areas of corneal infection.

The early use of proteins in perforating wounds of the eye is almost axiomatic. Benedict has stated that the oculist who does not use this is liable for neglect. A few men are advocating its use for preoperative cases, and its use is accepted routinely in postoperative cases. Its use is accepted routinely in postoperative infections. Non-specific protein therapy has a definite role in treatment of ocular diseases of a non-suppurative character, although the results are much less inspiring.

The general condition of the patient must be carefully considered before a foreign protein is administered, the contra-indications being low vitality, heart disease, etc. The antigens that cause strong reactions should be used only in a hospital where the patient can have suitable care and observation.

In conclusion, I would like to say that foreign protein when properly given is one of the most valuable agents that the ophthalmologist has at his command, and I am positive it has saved many eyes that otherwise would have been lost.

CASE REPORTS

CASE 1. A 42-year-old man was struck in the right eye with a flying nail. The next day redness and pain set in. Examination showed a perforating wound in the sclera about 3 mm. from the limbus. There was a tear in the iris and the lens was badly damaged. Marked ciliary injection and pain were present. Fundus was not discernible. Vision was blurred. Atropine, heat, salicylates and 5 cc. of milk were given the first day. Slight improvement was noted. After four injections of 10 cc. of milk, the pain subsided but did not disappear, and moderate ciliary injection was present. Vision was only slight light perception. Enucleation was advised but patient refused. He went home with the advice to have some bad teeth removed and to return in a week. Six weeks later he phoned that the other eye was paining and red. Because of a blizzard he was unable to come in. Atropine and heat were advised in the meantime. Three days later, the left eye was red and painful. Pupil was dilated (atropine) but anterior synechiae present. Anterior chamber was very hazy as were media. Iris rugae was discolored and swollen. He said vision was failing fast. I put him in the hospital. The consulting physician could find no general foci but bad teeth which he had neglected to have taken care of. Thirty million typhoid paratyphoid were given intravenously. A rather severe reaction followed. Temperature was 102° to 103° and he had marked chills. Forty-eight hours later, there was a definite improvement in the eye. Congestion was much less and anterior chamber clearer. Three days later, another dose of 30 million was given. Reaction was not as severe; temperature 100.6°. Eye cleared up nicely from then on and complete restitution resulted. Vision one month later with slight correction was 20/20. The focal eye was removed and teeth taken out.

CASE 2. A 30-year-old man gave a previous eye history of right eye badly injured at age of ten when a cap from a rifle bullet exploded when thrown in a bon-fire. Cornea scarred and

large, irregular coloboma of iris present. Lens hazy. Vision blurred objects. Left eye—acute iritis three years ago with good results. A few days ago eye became red and slightly painful. On examination, acute-iridocyclitis was definitely present. Tension normal. Treatment given was atropine, heat and salicylates. Some improvement in a few days. On the seventh day patient complained of severe pain. Anterior chamber shallow, congestion more pronounced. Tension 40 mm. Schiötz. Miotics started. Pain more pronounced and tension still up. Rushed him to Minneapolis, where he was studied under miotics for several hours. No improvement. Vision only faint light. Tension 55 mm. Paracentesis was done, with only slight improvement. Consultation held. Doctors were puzzled as to whether the right eye was focal or not. Finally they decided to give typhoid. Twenty-five million typhoid paratyphoid given. Heat and leeches used. The improvement was almost miraculous, after the first 24 hours. Final result vision with slight correction 20/15.

CASE 3. A 48-year-old farmer had his eye scratched by a splinter which flew up while he was chopping wood. He did not

pay any attention to it until three days later he noticed the eye was red and beginning to pain. He was treated by a local doctor for two days with an eye wash. Pain became worse and he noticed sight was impaired. The eye had a large ulcer about 3 mm. in size in the center of the cornea. There was a greyish yellow slough with indefinite edges. Smears showed staphylococci and streptococci with the former predominating. Ulcer cleaned and cauterized. Atropine and milk given. No foci discovered. After three days the condition was worse. Ulcer was progressing and it appeared that if not checked, rupture was inevitable. I used 25 million typhoid intravenously. After 36 hours, I slipped a knife needle into the anterior chamber. I was astonished at the improvement. Reaction was moderately severe. Temperature 101° which disappeared in a few hours. The next day pain and chemosis began to leave. The borders of the ulcer looked clearer. The ulcer from then on rapidly healed, leaving a dense central scar which is thinning out. I feel if this method had been used earlier, much better sight would have been obtained.

Submucous Lipoma of the Rectum*

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and

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SUBMUCOUS lipoma of the rectum is quite rare, even though this tumor is found more frequently in other portions of the gastro-intestinal tract. This discussion and review will include only those tumors reported in the rectum. Classification of these tumors is usually based on whether symptoms are produced or not.

Molliere,⁶ in 1877, reported two cases, one in a male aged 43, who passed the tumor spontaneously after rupture of the pedicle, and another in a female aged 83, who also passed a fatty tumor. Dewis,⁴ in 1906, reviewed 44 cases and among this number were six in the rectum. Stetten,⁹ in 1909, exhaustively reviewed the literature and collected 72 cases of tumors in the tract including seven in the rectum. In this series 50 per cent of the patients were between the ages of 40 and 60, a period when there is a tendency for the deposition of general adipose tissue. Deroque,³ in 1924, collected ten cases of this tumor in the rectum. Comfort,² in 1930, reviewed the literature and found out of 181 cases in the tract, only eight in the rectum producing symptoms and one without symptoms. Weinstein and Lieberman,¹¹ in 1935, collected 12 authenticated cases, including one of their own. This case was in a man aged 61. Gabriel,⁵ reports one case in a woman of 46, in 1937. Pemberton and McCormack,⁷ in 1937, in a review of the literature, collected 12 cases of this tumor in the rectum, 11 which produced symptoms, and one which did not. In nine of

these twelve cases there were five males and four females and the age incidence varied from 32 to 83, the average being 59.8. In the remaining three cases the age and sex were not stated. It will be seen from these reports that lipomas in the rectum are not common.

SYMPTOMS

The symptoms produced by these tumors may be pain, constipation, diarrhea, protrusion, and blood in the stools. Pain, constipation and blood in the stools were the most commonly reported. The tumors were almost all palpable. It is interesting to note that five reported were passed spontaneously. All cases reported recovered following local removal, except one in which a colostomy and posterior resection was necessary.

DIAGNOSIS

The diagnosis of the presence of the tumor is usually easily made on digital or ocular examination, but the type of tissue composing it is more difficult. Lipomas of the colon are seldom diagnosed preoperatively; those in the rectum may be more readily suspected, particularly if the mucosa over them is sufficiently thinned to give them a yellow color. The tumor when palpated has a soft lobulated consistency, is rounded, is usually single and varies in size from 1 to 12 centimeters in diameter. It may be sessile or pedunculated. Circulatory changes which have occurred in the tumor may alter its appearance, as well as the thickness of the overlying mucosa and superficial ulceration. If the tumor can be viewed through the proctoscope, the soft lobulated consistency

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Fig. 1. Diagrammatic sketch of tumor when in place.



Fig. 2. Diagrammatic sketch of tumor when prolapsed.

and the yellow tinge to the overlying mucosa may lead to a correct diagnosis. Biopsy, of course, may be undertaken.

HISTOLOGY

Comfort² has described thoroughly the pathologic anatomy of these tumors. The overlying mucosa may be atrophic, ulcerated, or normal. The shape of the tumor varies with the type of attachment and the size. The fat cells are usually of the adult type. The line of demarcation between the submucosal connective tissue and the fat becomes more definite in the larger tumors, and there is often a definite capsule. Septums divide the tumor into small lobules. Vascular and supporting tissues are present. Although benign, they may undergo necrosis, cystic degeneration, calcification, or sarcomatous degeneration.

TREATMENT

The treatment of these tumors in the rectum is accomplished by local removal without great risk.

I have one case to add to the literature. It is that of a male, age 87, seen and operated December, 1937. *History:* For the past 10 to 20 years the patient stated he had had a protrusion from the anus following bowel movements or straining. This felt fairly hard, was not painful, and was easily replaced. Occasionally there was slight bleeding, which was noted on the toilet paper, but there was never any gross bleeding. He stated very definitely that the protruding mass was not a hemorrhoid, and that as far as he knew he did not have any hemorrhoids. He had a tendency towards constipation, due most likely to peculiar eating habits, as he ate very few vegetables. He had taken mild cathartics for some years. The mass complained of, protruded regardless of the stool consistency, and also upon strain-

ing. There had been no weight loss and the patient was in excellent health. He walked about ten miles daily, had never been in ill health, and had worked continuously until recent retirement.

Anorectal examination showed a few external hemorrhoids and skin tags, and a complete ring of moderate sized ano-internal hemorrhoids, which were quite vascular and bled into the anoscopic fenestrum. On digital examination, a rounded mass was felt in the anterior quadrant, two inches inside the anus, which had a soft rubbery consistency. It felt about the size of an English walnut, was freely movable, was not attached to the prostate or underlying tissues and was not tender. This mass, felt, when in the rectum, like a polyp with a short pedicle. Onoscopic examination, however, it appeared as a bulging underneath the mucosa rather than a polyp. The overlying mucosa was slightly reddened and was abraded in several areas. It was quite evident that the tumor did not arise from the mucosa. Proctoscopy above this level revealed a normal mucosa except for a small sessile adenoma, 0.25 cm. in diameter, on the left lateral wall at 16 to 18 cm. distance. Following this examination, the patient was allowed to go to the toilet as it was impossible for him to extrude the mass in the examining room. Upon return the mass was prolapsed outside the anus and now appeared as a red, mucosa-covered tumor, the mucosal covering being superficially abraded in several areas, and when wiped with gauze, bled slightly. The consistency was that of rubber but more firm than when in the rectum. The mass was two centimeters in diameter and was not tender. The mucosa on the wall side formed a distinct rather broad pedicle. No pulsation could be felt in the pedicle, but when the tumor was squeezed between the fingers, its size could be slightly reduced, and for this reason a vascular tumor

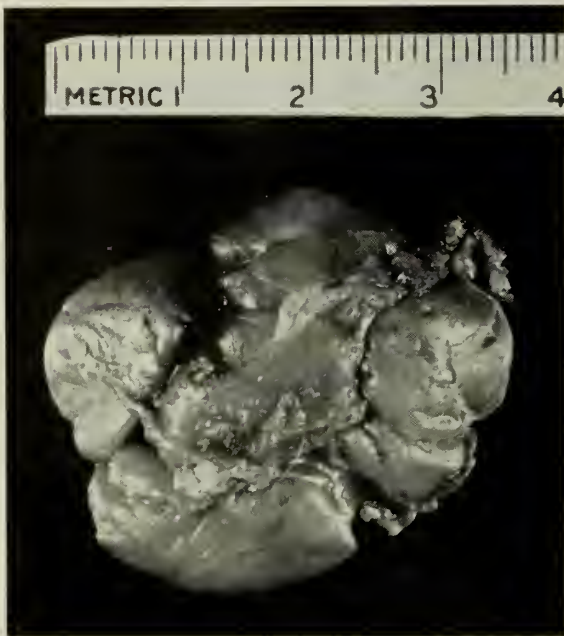


Fig. 3. Tumor removed at operation.

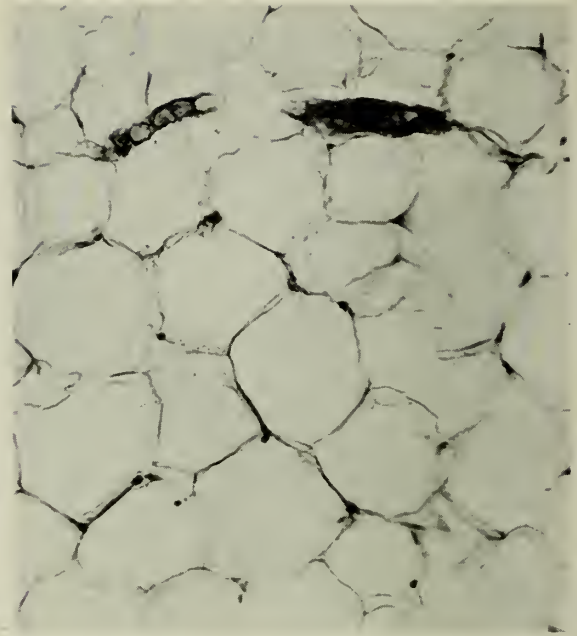


Fig. 4. Low power microscopic photograph of tumor.

was considered. It was impossible to tell from what tissue the tumor arose, but myoma, fibroma, lipoma, and fibrous angioma were considered. Owing to the consistency, however, lipoma was considered as the most likely.

Treatment: Anaesthesia was secured by transsacral block. The anus was gently dilated, and the tumor was brought outside the anus with a forcep. The pedicle was carefully palpated for pulsating vessels of size, and a hemorrhoid clamp was applied across it. The mucosa covering the tumor was incised and the mass easily shelled out, as it was but slightly attached. It proved to be an encapsulated, lobulated, fatty tumor, measuring $3\frac{1}{2}$ by $2\frac{1}{2}$ by 2 centimeters. Microscopic examination by Doctor J. S. McCartney, Jr., of the University of Minnesota, showed it to be a typical lipoma. The redundant overlying tissue was removed and the severed edges of the bowel approximated with chromic catgut, and the clamp removed. There remained a hollowed-out space in the bowel wall where the tumor had lain. The wound healed nicely in four weeks. The only after-treatment consisted of keeping the bowels soft and the intrarectal injection of mild antiseptics.

SUMMARY

A review of the literature reveals that submucosal lipoma of the rectum is rare, only about 15 cases being reported.

While not dangerous, they are usually troublesome to the patient, and for that reason should be removed.

There is little danger to their removal and all cases reported in the literature made uneventful recoveries.

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Problems in the Diagnosis and Treatment of Cholecyctic Disease*

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THERE are three established facts in regard to cholecyctic disease to which every physician will subscribe. The first is that cholecystectomy is one of the most successful of all surgical procedures when applied to patients with gallstones and biliary colic. The second fact is expressed in the criticism so often voiced by internists, that many patients have been subjected to cholecystectomy without benefit and that, in retrospect, a prediction of unsatisfactory results could often have been made before operation. The third fact is that which the surgeon uses in rebuttal of this criticism; that he is compelled to risk surgical exploration in far too many neglected and complicated cases of cholecyctic disease and that physicians are more impressed by the occasional failure of operation to cure than by the unnecessarily high mortality of delay. The logical conclusion to be drawn from these statements is that there is a reliable method of relieving patients with calculous cholecyctic disease which is at times misapplied or not applied at all until very late in the course of the trouble. The matter of diagnosis, in other words, is at fault.

To review the whole problem of the diagnosis of cholecyctic disease is beyond the scope of this paper, but there are certain aspects of diagnosis, especially in "medical" types of cholecystitis, which will be considered. The means by which cholecyctic disease may be identified has been presented so many times that one hesitates to discuss again the subjective and objective evidence on which the diagnosis is based. The data most essential to diagnosis are contained in the patient's story; the objective evidence comprises observation of the patient in an attack and the findings on cholecystography. Finally, the value of diagnosis based on exclusion should not be overlooked, and one must be at pains to exclude other lesions simulating cholecystitis. These factors have been purposely placed in what is believed to be the relative order of their importance.

What are the sources of error in the diagnosis of disease of the gallbladder? Positive errors, that is, those due to confusing other functional or organic abdominal disease with cholecyctic lesions, are chargeable to several sources of which only the most important can be mentioned here. The first and greatest source of difficulty has to do with the interpretation of the history; the second with misplaced confidence in the infallibility of cholecystography, and the third with failure to exclude conditions simulating cholecystitis. The negative errors, that is, those in which the diagnosis of cholecystitis is missed, are traceable first to the fact that a diseased gallbladder is quite capable of producing on occasion a normal cholecystographic shadow; second place is taken by the error of charging authentic symp-

ptoms of cholecystitis to other ailments which the patient may actually have, an irritable bowel or a duodenal ulcer being the two conditions most commonly productive of error. Finally, many diagnoses are made late because of the remarkable latency of gallstones and the fact that suppuration, gangrene, empyema, or the formation of cholecystoduodenal fistulas may occur with only the mildest and most indefinite symptoms.

THE AUTHENTIC SYMPTOMS OF CHOLECYSTITIS AND THE MEANS BY WHICH THEY ARE PRODUCED

The first and last consideration in the diagnosis of cholecyctic disease is the patient's history, and the most important diagnostic feature of this history is the character of any pain which he may have suffered. In securing an account of pain, the psychic make-up and temperament of the patient must be considered, since in many nervous, costive, migrainous individuals a history of severe pain has to be heavily discounted. If pain is present as typical biliary colic, however, it is not likely to be confused with the pain of any other ailment, regardless of the patient's nervous constitution. The suffering occasioned by biliary colic has often been said by those who have had personal experience with it to greatly exceed the pain of labor. As a rule, the distress is paroxysmal and comes and goes in waves. It often passes off as suddenly as it began, even when no narcotics have been given. The final location of the pain as described by patients is variable, a point which has not been sufficiently emphasized; the usual site of origin is the epigastrium or a point in the right upper quadrant of the abdomen, but in many cases an atypical distribution of pain is noted. Infrequently, pain may begin in the back and be projected anteriorly; left-sided pain is not particularly uncommon, and it has been suggested by Libman that contralateral pain of this type is more commonly noted in hyposensitive individuals. Pain may be projected into the chest, thus simulating angina pectoris.

The means of relief from biliary colic is important. Morphine is usually required in considerable amounts, although milder colics may respond to barbiturates, amyl nitrite, or to nitroglycerin which relaxes the sphincter of Oddi. Small doses of morphine may actually increase the pain because of its effect in causing contraction of the sphincter. The duration of the attack is usually brief, particularly if morphine is given; pain which lasts for several hours or days may be taken to indicate the development of an inflammatory process.

There is no general agreement as to the exact mechanism by which biliary colic is produced. The usual explanation is that pain is produced by contraction of the gallbladder on its contents, or on foreign material in the cystic duct, or against the back pressure offered by

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the sphincteric mechanism at the end of the common duct. In connection with the physiologic mechanisms of colic, Zollinger's interesting experiments should be mentioned. By distending the gallbladder itself with a balloon introduced at laparotomy he was able to demonstrate that the sensation most commonly produced was a deep epigastric discomfort somewhat similar to the postprandial "indigestion" described by patients with gallstones; discomfort thus produced was not referred or projected. If, however, the gallbladder was distended in this manner to a point where it made contact with the parietal peritoneum, then pain localized in the region of the gallbladder. Distention of the common duct alone produced much more severe pain, and vomiting usually occurred, but referred pain was still lacking. Zollinger therefore came to the conclusion that biliary colic is a true visceral pain, and that referred pain projected to the right scapula is due to inflammation or irritation of the peritoneal surfaces adjoining the gallbladder.

There is a good deal of additional evidence to indicate that rise in pressure within the bile ducts or gallbladder is the factor responsible for biliary pain of the visceral type. Recently, studies have been made on individuals with T-tubes in the common duct, by Butsch and McGowan; later by Doubilet and Colp. These show clearly that spastic contractions of the choledochus sphincter occur in human subjects and that they produce large rises in intraductal pressure and severe pain. It seems probable, therefore, that biliary colic is essentially due to a disturbance in the activities which unite the gallbladder and the choledochus sphincter into one functional unit.

On this basis there is obviously some justification for considering three separate types of gallbladder pain phenomena. The first, an aching "cumulative tension" type with some projection to the right subscapular region, depends on contraction of the gallbladder alone, or at least on increased pressure within its lumen; the second, or true biliary colic, depends on forceful contraction of the gallbladder against the contracted sphincter of Oddi, with a rise in intraductal and intracholecystic pressure and the third is due to an inflammatory reaction in the acutely inflamed or distended gallbladder.

The visceral "storms" of cholecystic disease are not confined to the biliary tract alone but involve the duodenum, which may show spastic contraction of its second and third portion; even powerful contractions of the pyloric antrum may occur, with reverse peristalsis, nausea and vomiting. It requires little imagination, once the facts are known, to establish the relation of the motor function of the biliary apparatus to the symptoms so commonly mentioned by the patient. The fullness and tension after meals are due to contractions of the gallbladder induced by the cholecystokin which is liberated during the digestive process, the bloat and belch to duodenal and pyloric spasm and reverse peristalsis, and the violent colics to contractions of the gallbladder against a stone in the cystic or common duct or against a hyperactive sphincter of Oddi. Sharply localized pain, with posterior projection, local tenderness and hyperesthesia, is due to peritoneal irritation.

What becomes of all the other symptoms ascribed to cholecystic disease? Recent writings have increased the number of these symptoms to include practically every known symptom of an abdominal disorder. To list such symptoms here would be superfluous; the reliable *primary* symptoms of cholecystic disease are those produced by contractions of the gallbladder against the sphincter of Oddi or other resistance in the bile channels, and by the reflex irritability of the pylorus and duodenum; the *secondary* symptoms depend on obstruction to or infection of the biliary passages. Other symptoms are unreliable and may be misleading unless accompanied by clean-cut objective evidence of cholecystic disease.

OBSERVATION OF AN ATTACK

The observation of a patient during or after a bout of pain yields diagnostic information of great value, especially if it may have been suspected that the patient is exaggerating his complaints. It is usually a difficult matter to make a satisfactory examination of the abdomen during actual colic. Later, the liver may be found to be somewhat enlarged and the gallbladder region exquisitely tender; there is often considerable defensive spasm of the right rectus muscle and guarded costal respiration. Residual deep tenderness, a common residue of colic, is probably an expression of an inflammatory process in the walls of the gallbladder. Cutaneous hyperesthesia is often noted following an attack; it is usually most pronounced over the gallbladder, but there may be a wide hyperesthetic zone over the lower ribs which may themselves be sensitive to pressure. Fever, leukocytosis and a rapid sedimentation time are noted in about 50 per cent of cases following colic; if these persist, the onset of a suppurative process, empyema, or gangrene should be suspected. Slight scleral icterus and bile-stained urine after biliary colic suggests, but does not necessarily indicate, the presence of a stone in the common duct since jaundice may follow mechanical pressure on the common duct by the distended gallbladder. A direct van den Bergh reaction, slight increases in serum bilirubin and minor degrees of bromsulphalein retention may be present for a few days after a colic. These last-mentioned laboratory tests may be of great importance in distinguishing true colic from the spurious variety.

SOURCES OF ERRORS IN CHOLECYSTOGRAPHY

It is not intended that present methods of visualizing the gallbladder should be criticized, since they have been of the greatest value in diagnosis and cholecystography has undoubtedly contributed both to the matter of early diagnosis and to the avoidance of unnecessary surgical procedures. There is still some difficulty, however, in the field of interpretation. Cholecystography is a technical procedure subject to technical errors and interpretation based on personal experience; it should not be allowed to supplant clinical judgment entirely but should rather supplement it. Positive errors in cholecystographic diagnosis are often based on misconceptions of what constitutes a pathologic response. If stones can be visualized, or if no cholecystic shadow can be demonstrated, there is very little argument about the presence of definite pathologic change. Other deformities of the shadow,

however, are of little importance. The so-called Phrygian cap, angulation of the shadow, abnormalities of size and position, and various types of distortion of the shadow, are of doubtful pathologic significance if the shadow is of good density and normal emptying occurs.

Shadows of stones are usually unmistakable, but errors may arise because of the presence of intestinal gas which sometimes produces mottling of the cholecystic shadow. Variations in the shape and position of these shadows will in most instances suffice to identify them but, in other instances, the shadow of the gallbladder is so obscured that stones cannot be excluded. In such cases repetition of cholecystography and the use of pitressin may eliminate the difficulty. Roentgenograms of the gallbladder which show a faint shadow are characteristic of the border-line case and frequently call for a repetition of cholecystography and, what is more important, a critical review of the patient's history in respect to the cardinal primary symptoms of cholecystic disease previously mentioned. Minor temporary degrees of disturbed cholecystic function may exist, especially following episodes of subacute cholecystitis and, if the history and roentgenologic findings are not in agreement, repetition of cholecystography at a later date may put a different light on the matter. Parenchymatous hepatic disease may be responsible for a faint or absent gallbladder shadow; if there is gastric retention or vomiting from other causes, the same difficulties may be encountered.

One of the greatest difficulties in the application of a roentgenologic diagnosis arises when the gallbladder is reported as normally functioning in the face of definite symptoms of colic and dyspepsia. A stone-filled gallbladder may retain enough intact mucosa to cast a normal roentgenologic shadow which will obscure the stones themselves and, as Caylor and Bollman showed, papillomatous types of cholecystitis will cast an even more dense shadow than a normal organ. In such cases the main consideration in diagnosis is first to establish an authentic history, and later to exclude lesions of other organs which may simulate the pain and dyspepsia of cholecystitis; if this can be done, the diagnosis of cholecystic disease may be made with some certainty on the history alone. Another serious difficulty has to do with the equivocal cholecystographic response in noncalculous cholecystitis, a matter which will be mentioned later.

EXCLUSION OF CONDITIONS SIMULATING CHOLECYSTIC DISEASE

A monograph could be written on this subject alone and one must be content with merely naming the common sources of diagnostic error. The greatest difficulty arises when individuals with so-called mucous colitis or the syndrome of bowel irritability complain of diffuse aching soreness throughout the right half of the abdomen. In addition, many such patients suffer from pylorospasm and the visceral upsets of migraine and many, for reasons of their own, have adopted a policy of food selection, having previously, as they think, been upset by coarse or fatty foods. In such cases a diagnosis of cholecystic disease must be made with caution no matter what cholecystographic evidence is present.

A penetrating or inflammatory duodenal ulcer with attachment to the head of the pancreas may produce a very perfect imitation of biliary colic, the principal point of differentiation being the background of ulcer dyspepsia. When gallstones and ulcer coexist, as they often do, separation of the symptoms referable to the two conditions may be extremely difficult. Diaphragmatic hernia is another source of diagnostic difficulty, since this condition may produce both dyspepsia and a bizarre syndrome of pain which are at least suggestive of cholecystitis. If dysphagia or pain on stooping or exertion is a feature of any abdominal complaint, roentgenologic examination of the esophagus and stomach to exclude diaphragmatic hernia is in order.

Neural or neuromuscular pains due to fibrositis or to segmental arthritic lesions of the spine often cause much confusion in diagnosis, although the relation of such pains to movement, exertion, changes in weather and respiratory infections should help to identify the condition; the mode of relief from rest, aspirin and heat is also important. There are many such cases, however, in which the diagnosis is largely a matter of opinion. We at the clinic have received a good deal of help from the therapeutic use of an analgesic dose of roentgen-rays which relieves mural pains quite consistently and has little or no effect on that arising from cholecystic disease.

Among the disorders which less commonly simulate cholecystic disease one may mention abdominal angina, tabes dorsalis with gastric crises, and hydronephrosis. Such confusion rarely arises nowadays and in only the exceptional case is the imitation of cholecystic disease sufficiently close to be responsible for errors in diagnosis.

CHRONIC NONCALCULOUS CHOLECYSTIC DISEASE; FUNCTIONAL AND ORGANIC FORMS

Noncalculous cholecystitis is almost as common as chronic appendicitis. The diagnostic problem is not so much that of incriminating the gallbladder as a cause for symptoms as to decide on the proper means of treatment. One of the most difficult of clinical decisions hinges upon the question of just how much can be blamed on slight damage in the gallbladder. One must admit that very minor lesions may produce severe pain and that, in such cases, cholecystectomy is curative. In an earlier paragraph some consideration was given to the means whereby such painful sensations arise in the biliary tract, and it was pointed out that increases in pressure in the gallbladder or bile ducts may arise from a lack of correlation between the musculature of the gallbladder and that of the sphincter of Oddi, thus causing definite abdominal distress and reflex digestive symptoms. Pain therefore does not necessarily require the presence of stones or an infectious process for its production.

Because of the lack of agreement between clinical symptoms and pathologic findings, Judd and his co-workers pointed out that the limitations of the term "noncalculous cholecystitis" had never been clearly defined, either pathologically or clinically. The pathologic aspects of the problem need no discussion; clinically, the symptoms which have been attributed to both cholesterosis and to the chronic inflammatory types of non-

calculous cholecystitis may be said to be variable in the extreme and to cover almost the whole range of systemic and abdominal ailments. The most reliable and consistent symptom of both conditions is a recurrent, flatulent dyspepsia, usually accompanied by dull pain and aching discomfort in the epigastrium or right upper quadrant of the abdomen. Many patients with noncalculous cholecystic disease are aware that their distress is aggravated by a full meal, by roughage, by fried or greasy foods, or by caffein-containing beverages, and as a result many individuals become particularly selective in respect to their foods.

In about 25 per cent of cases, ulcer-like symptoms are noted which are suggestive of reflex pylorospasm. Regurgitation of food, pyrosis, and nausea also suggest disturbances in the motor function of the stomach with reversal of peristalsis. Constipation, abuse of laxatives and bowel irritability are very frequently encountered. Such difficulties of colonic function may be attributed in part to actual reflex disturbances in the motor function of the intestinal tract or to self-imposed dietary restrictions.

The actual pain produced by noncalculous chronic cholecystic disease is as variable and inconstant as the dyspeptic features of the disease; classic biliary colic is relatively infrequent, Graham and Mackey placing the incidence at approximately 33 per cent. Occasionally morphine or morphine derivatives administered for other reasons will cause violent increases in this distress or even precipitate actual biliary colic.

The cholecystographic data in cases of noncalculous cholecystitis may be mentioned briefly here. In Graham and Mackey's series, 114 cholecystograms were taken, of which ten showed an entirely normal gallbladder, eight some deformity of the gallbladder shadow, seventy-five a faint shadow, and twenty-one no evidences of cholecystic function, that is, an absent shadow. Wilkinson, in reviewing a similar series, found that of eighty-three cholecystograms, thirty-one showed a normal shadow, twenty-three a faint shadow and twenty-nine no filling of the gallbladder. In other words, the concentrating and evacuating properties of the gallbladder were maintained at least to some extent in the majority of these cases and in only a relatively small number was there unequivocal cholecystographic evidence of disease. Conservative observers have for this reason learned to be cautious in interpreting roentgenologic reports of a faint or deformed gallbladder shadow when actual pain or biliary colic has not been a feature of the patient's complaint.

The "stasis gallbladder" remains to be considered. It may be defined as an anatomically normal, or nearly normal, organ which by some perversion of physiologic activity is capable of producing dyspepsia, colic and other symptoms of organic cholecystic disease. The existence of such gallbladders has been both denied and affirmed, but it now seems clear that there is both clinical and physiologic evidence to indicate that the syndrome is authentic. It is a well recognized fact that all of the symptoms of cholecystic disease, including those closely resembling colic, may be present without much visible evidence of either infection or cholesterosis; yet removal

of the gallbladder not infrequently will relieve the presenting symptoms.

The functional causes of stasis are, according to Ivy: (1) duodenal irritation and inflammation; (2) reversed duodenal peristalsis; (3) spasm of the sphincter of the choledochus due to reflex motor disturbances or inflammation of the ampulla of Vater; (4) motor inactivity of the gallbladder due to an inadequate diet, with deficiencies in the intake of meat, fat and fruit juices; (5) an abnormally small cystic duct, and (6) the presence of a sphincter in the cystic duct. Cole has recently emphasized that there are a number of anomalies of the cystic duct capable of interfering with cholecystic evacuation and of producing pain. There is no general agreement as to just how these abnormalities of evacuation are to be classified or just how they affect the motor physiology of the upper digestive tract.

"Spastic distention," which corresponds to Westphal's syndrome of vagal overactivity, is said to occur most commonly in obese women of the so-called vagotonic type; the principal complaint is of mild, colicky pain projected to the back, often occurring at night or when the patient is fatigued. The symptoms are described as intermittent and relief obtained by taking food may be a feature. The gallbladder on roentgenologic examination is large and has been said to empty slowly. The cause of pain in these cases is not difficult to explain. Ivy and Sandblom have shown that, in human subjects, contraction of the gallbladder (produced by cholecystokinins) against a spastic sphincter of Oddi will produce severe pain which can be relieved by the introduction of magnesium sulfate or olive oil into the duodenum to relax the sphincter.

The mechanism of pain production in *atony of the gallbladder* (Westphal's syndrome of sympathetic overactivity) is considerably more difficult to understand. Chiray, Pavel and Lomon quoted Galen as saying that atony might affect the gallbladder just as it does the urinary bladder. In most of the cases of cholecystatony described, the condition seems to have affected older individuals of the asthenic type who had lax abdominal walls, visceroptosis and bowel irritability. Among the symptoms which have been described are chronic dull pain in the region of the gallbladder and a palpable and tender gallbladder; these complaints are supposedly relieved by duodenal drainage. Cholecystography is said to show a long, thin type of gallbladder which changes its contour with changes of position. The shadow is reduced in density and evacuation is prolonged.

While both these syndromes of biliary dyskinesia are rather nebulous, it must be admitted that a patient is occasionally seen who fits one or the other general descriptions just given and who appears to have some motor disturbance of both the biliary and digestive tracts not clearly referable to organic disease of the gallbladder itself. Obviously the stasis gallbladder represents a functional motor disturbance and one which is better adapted to medical management than to cholecystectomy. One may reasonably ask if it is possible to make an accurate diagnosis of chronic noncalculous cholecystitis or of stasis gallbladder. There are many who doubt it and, as Wilkinson has pointed out, the diagnosis is diffi-

cult to make or to justify. Such a diagnosis is reserved for individuals with mild symptoms suggestive of biliary tract disease and equivocal or absent cholecystographic data. It is interesting to note that the number of non-calculous gallbladders removed on the above indications is falling steadily in most large institutions; whether this will prove to be good judgment or not only the passage of time will decide.

The noncalculous varieties of cholecystitis have been emphasized here chiefly because it is in this group of cases that cholecystectomy has been disappointing. As all available reports of surgical experience show, the major factor which determines the success or failure of cholecystectomy is the presence or absence of biliary colic. If colic has been a feature of the complaint, a cure may almost be assured no matter what pathologic changes may be present in the gallbladder, but if this feature is lacking, the probabilities of success are greatly reduced.

What is to be done with the "nonoperated case" of noncalculous cholecystic disease? Every physician sees such patients and every gastro-intestinal dispensary is plentifully supplied with examples of the condition. The usual "gallbladder diet," low in fat and cholesterol, is ineffective even when fortified with saline laxatives and antispasmodics. Duodenal drainage, in the majority of instances, accomplishes but little in relieving symptoms. The application of physiologic principles to treatment has only recently been undertaken and the results to date are at least encouraging. Ivy has recommended a diet as high in fat as the patient's tolerance will permit, together with bile salts to encourage biliary flow and the cautious use of alkaline or saline laxatives below the dosage likely to produce a "cathartic colon." Wilkinson advises a bland diet with frequent feedings, sedatives and antispasmodics, and Andresen advises a somewhat similar regimen. Mock, Brown and Dolkart advise a regimen of hourly feedings of milk and cream, the use of bile salts (ketocholeonic acid), and sedatives together with antispasmodics. The essential principles of all of these forms of treatment are the same; the higher intake of fat stimulates frequent contraction and emptying of the gallbladder, the bile salts increase biliary flow and perhaps serve to relax the choledochus sphincter, and the

sedatives and antispasmodics reduce the irritability of the sphincteric mechanism and duodenum. Good results are by no means universally obtained with therapy of this type, but in cases in which the surgical indications are not clear, medical management along these lines may be recommended, at least until further observation has been carried out.

SUMMARY AND CONCLUSIONS

The principal criteria for the diagnosis of cholecystic disease have been reviewed, with especial reference to the sources of diagnostic error, and the special problem of noncalculous cholecystic disease and biliary stasis are considered with reference to diagnosis and treatment. Since the surgical results in the last-mentioned conditions are distinctly inferior to those obtained when the gallbladder contains stones, conservative medical management based on physiologic principles is recommended.

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The Function of the Student Health Service In a Municipal University

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ONE of the relatively recent trends in higher education is the development of our municipal colleges and universities. This type of strictly tax-supported college had its beginning in 1837 with the founding of the University of Louisville, Kentucky. At

the present time, there is an undetermined number of such colleges and junior colleges in the United States. The exact figures of the enrollment of students in these municipal institutions cannot be stated, but an approximation that 20 per cent of our college students in the

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United States attend such tax-supported institutions would probably not be too high.

In addition to the schools of college and university rank, there are many two-year schools, or junior colleges, often not known beyond the small territory which they serve. Their total enrollment would add a large number to those students receiving their higher education through the activities of our cities and boards of education.

It has long been an established and accepted fact that colleges and universities should assume some responsibility for the physical life and health of their students. Since the beginning of the first student health service at Amherst in 1860 for the purpose of selecting students physically capable of engaging in athletics and sports, the scope of the service rendered by student health services to the student and to the school has gradually increased. The amount of responsibility assumed varies greatly with the size of the college, its location, and underlying philosophy of its health obligation to the student. The older, larger, and privately endowed schools have, for the most part, developed student health services which provide essentially a complete medical and surgical service to the student for the payment of an annual fee. This broad interpretation of a college's obligation to the student is, of course, a form of health insurance; for, by the payment of an annual fee, the student is usually given complete medical and surgical care, dental service, X-ray and laboratory service, and a varying length of hospitalization if necessary.

The objectives of a student health service in any college may be briefly outlined as follows:

1. Sufficient education and training of the student to enable him to care for his health intelligently, through hygienic and proper habits of living. The hygiene of the student in college today will, in a sense, become the hygiene of the population in which he will be a leader in the future. The college health problem is not so much concerned with disease as with the fostering and increasing the strength of people not yet mature, so that a foundation may be laid for long, healthy lives.

2. Protection of the student body as a group from the introduction and spread of contagious and communicable diseases.

3. Supervision of the sanitary facilities of the school buildings, dormitories, rooming houses, etc., that the student may not be forced to live or work in unhygienic surroundings.

4. Care of acute illness which requires immediate and emergency attention.

5. Physical examinations of all entering students to determine their fitness to participate in the required courses of physical education and in the more strenuous elective intercollegiate athletics. To do this, adequate records must be kept of all students, and competent interpretation made of the results of the examination.

6. Assistance to the student in selecting or planning his course of study so that it will correlate with his physical and mental abilities. The prevention of overwork on the part of some students is often a

necessity. Inasmuch as the student seldom pays by his tuition the actual cost of his education to the school, this phase of the student health service work may be interpreted as a safeguard of the capital investment of the institution. There is no economy in graduating a student who will be shortly compelled to withdraw from the practice of his profession because of illness, due to poor supervision of his health habits while attending college.

Fundamentally, the problems of the student health service in a municipal university are the same as in any school of higher education. The students are of the same age group and are no better nor any less prepared for college life than students of other schools; therefore, aspects of the health education of this group are essentially the same in all schools. There is, however, less need for the broad administrative development of the health service in the municipal school that is found in the larger, endowed school. Most of the students in a municipal university live at home. If there are dormitories on the campus, they will be few and small, and will house relatively few students. Many of the city colleges have no dormitories; the few students attending the school from out of town find their own accommodations. As the school district is located in a city, these rooming houses will be supervised by the local department of health and should, therefore, constitute no health problem to the university.

The fact that most students in a municipal university live at home makes the handling of their health a different problem than in the ordinary school. Students who have travelled long distances away from home to attend college have a right to expect that facilities will be provided for their care in the event of illness. The university must stand, in a sense, in place of the parents in caring for the student. This is a generally accepted theory in most universities. Moreover, in the case of large schools located in small towns or cities, local medical facilities are often inadequate to care for the large numbers of students brought to the community by the school. The authorities are, therefore, of necessity forced to provide satisfactory medical service. When, however, the majority of students live at home or with relatives, this responsibility can and should remain at home. There will, in most cases, be a family physician who has cared for the student during previous illnesses and who has a better knowledge of the personal and family history than the student health service physician could hope to learn with his brief contacts. There is no logical reason why the family physician should not continue to care for such a student in the same manner he would have had not the student enrolled in the university. The same thing may be said of hospitalization of a student. The municipal university is not faced with that problem as are other schools because the parents or relatives of the student are at hand and can see that adequate hospital care is given if needed.

The few cases of out-of-town students in the city university who require hospitalization can be cared for in an emergency by sending them to the city hospital. The school is in this way saved the expense of erecting and

maintaining an infirmary for ill students. This will, perhaps, make the health service less adequate in caring for the students than it might be; but, in general, local facilities will be sufficient to care for the few cases where the school must assume some degree of emergency responsibility.

Wayne University is a municipal university operated by the Board of Education of the city of Detroit. It was formed by the union in 1934 of five colleges operated by the board in order to facilitate the administration of the various schools. The Student Health Service was first organized in 1928 as a part of the College of Arts and Sciences. A physician was employed on a part-time basis with a registered nurse in attendance at all times. Physical examinations of entering students were made, and an office and clinic maintained for emergency care and consultation. In 1935, a full-time physician and member of the staff of the College of Medicine was made director of the Health Service in order to bring the various medical activities of the Board of Education under the direction of the College of Medicine. The Health Service is now located in its own building at 5041 Cass Avenue, just north of the main building of the University. Thorough physical examinations are made of all entering students and their records are kept up to date during their college careers.

Students are graded in accordance with the results of their physical examinations and permission is given or withheld for participation in athletic activities. All college sports are supervised by the Health Service, and a physician is in attendance at all football games. Since its inception, the Student Health Service has become of increasing value to the students of the University. Requests for service have increased from an average of a few hundred per year during the first several years to a total of 7,653 in 1937-38. The reasons for these requests vary from routine rechecks of physical findings to a need for care in sudden acute illness. There is no follow-up system in routine use at the present time, but it is needed, and will be started as soon as possible. All physical defects found during the examinations and needing correction are referred to the parents and the family doctor for appropriate care.

The students of Wayne University are not given medical care within the usual meaning of that term. Emergency care is given, but subsequent treatment, if necessary, is referred to the family physician. Many students consult the Health Service regarding chronic illness or ask advice about treatment of a known defect. Such advice and consultations are freely given, but all treatments and actual care of the student is placed in the hands of the parents or guardian and family doctor. Athletes competing or trying out for teams representing the University are given medical care to the extent of the facilities of the Health Service in the event of injury. When such facilities are inadequate, the student is referred to the family physician or an appropriate specialist. In circumstances where it is deemed advisable, the physician's fee is paid by the University. No hospitalization is offered to the students by the Health Serv-

ice, and no infirmary is maintained. Wayne University's Health Service fee of \$1.50 a semester is the lowest in the United States for a university of comparable size maintaining a regular student health service with a full-time physician, and where such a fee is charged. A few beds are kept in readiness in the Health Service Building for emergency illness, but the student is kept there only until arrangements are made for his removal to the home, or hospital if necessary. These beds are also available to students assigned to regular rest periods during the day by the Health Service because of chronic ill health.

Education of the students in matters of health and hygiene is considered the main objective of the Student Health Service of Wayne University. An attempt is made during each personal interview to give authentic advice regarding personal health problems to the end that the student may better understand what can be done and where such aid may be obtained. During the past year, 2,080 students were referred to their own doctors or dentists for appropriate care; and when the student had no family physician, aid was given in selecting one appropriate to the need from a list approved by the Wayne County Medical Society. It is felt that the student completes his four years in college with a better understanding of what medical science has to offer, and a knowledge of how to utilize that information for his own benefit. He should by that time be on good terms with his family doctor; we feel that every such contact made should be to the benefit of medical science, the physician and the patient.

SUMMARY

1. There has, in recent years, been a great increase in the number of students enrolled in the municipal universities of the United States.
2. Most of the students of such universities live at home or with relatives.
3. The municipal university is not, therefore, under the obligation of providing the same extensive medical care for the student as is the larger, older, privately endowed school, where a majority of students are living away from home.
4. The main objective of the Student Health Service in a municipal university should be the education of the student regarding matters of personal health and hygiene, and the strengthening of the bond between the student and his private physician when medical care is needed.
5. The usual municipal university will find the city hospital facilities adequate for the care of ill students; and need not maintain any student infirmary.
6. Physical examinations upon entrance; supervision of athletics; control of contagious diseases; and inspection of the sanitary facilities of the school buildings should be a part of the student health service program in a municipal university as in any other college or university.

The Modern Use of Peroral Endoscopy*

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ONE of the brilliant chapters in the progress of medical science has developed through the use of rigid lighted tubes to examine and treat pathological conditions of the larynx, the trachea, and the esophagus. The history of endoscopy dates back over a century. Bozzini of Frankfort in 1806 designed a lamp called a light conductor "for looking into the dark cavities of the body." The illumination was furnished by a candle. There is no record that this instrument added to medical progress except to furnish an idea. In 1853 Desormeaux of Paris introduced an apparatus lighted by a gasogen lamp. He has been called the founder of endoscopy. The "dark cavities" examined were the urethra, bladder, rectum, ear and pharynx. Cruise of Dublin, about 1865, modified and improved Desormeaux's instrument and suggested the study of the air and food passages. There followed several ideas in esophagoscopes, notably those of Waldenburg, Stoerck and McKenzie. These consisted simply of tubes, rigid or jointed; light was reflected indirectly from a laryngeal mirror held in place at the proximal end. The failure of tubes of this type to advance esophagoscopy was undoubtedly due to the inadequate illumination.

In 1881, Mickulicz of Vienna with the help of Leiter, an instrument maker, developed an instrument with direct illumination, and his studies are credited with establishing the technique and clinical importance of esophagoscopy. The advent of the Edison lamp and further improvements in the tubes by von Hacker, in 1889, extended the practical use of esophagoscopy. In 1894, von Hacker inspected the tracheobronchial tree for diagnostic purposes. In 1895, Kirstein devised a laryngoscope which provided important observations on the larynx by direct visualization. Killian, in 1896, began devoting his entire time to endoscopy and devised improved instruments and technique.

In 1902, Einhorn of New York designed the distal lighting principle. He had published the first article in America on esophagoscopy in 1897. In 1904, Ingals of Chicago employed a distal light in a separate carrier in a Killian tube. He also introduced in place of Killian's large oval opening, a number of respiratory apertures. The year 1904 marked the beginning of the contributions of Chevalier Jackson. In that year, he combined the distal lighting principle of Einhorn with Killian's tube by means of an auxiliary tube in the wall of the main tube for the passage of a lamp carrying rod. In 1905, Jackson designed a bronchoscope with two auxiliary tubes in its wall, one for a light carrier and the other for a suction tube. To these endoscopic tubes he attached a handle fixed at a right angle. In 1908, Brunnings, who became Killian's chief assistant at Freiburg and later professor at Jena, introduced double ex-

ension esophageal and bronchoscopic tubes which considerably improved the method of introduction. He devised the electroscope for illumination. In 1910-1911 he published his textbook, which was translated into English in 1912 by Howarth.

From this time on, the contributions of Jackson and his pupils overshadow all efforts in the field of peroral endoscopy. Improved instruments, the solution of special problems and a widening clinical experience advanced the specialty in great strides. Noteworthy contributions have also come from Hasslinger in Europe, Moore and Negus in England, and Mosher and Imperatori in America.

We are accustomed to think of two general schools of endoscopic technique, the American school arising largely through the work of Jackson and employing his distally lighted instruments, and the European school centered chiefly around the teachings of Killian, Brunnings and Hasslinger and using the proximally lighted instruments. It is not my purpose to discuss in detail the merits of the instruments and technique of these two schools. The Jackson are light, distally illuminated tubes which are capable of delicate manipulation. Figure 1. The small distal light does not project the illumination beyond the end of the tube as far as a proximal light does. This is an important point to many endoscopists. Some British workers have added an extra light carrier for twin lights to the Jackson models in the interest of better illumination. Figure 2. Until recent years, those who prefer distally lighted scopes have usually employed the Brunnings instrument in which the line of vision was through a slot in the mirror used to reflect the light. An unobstructed line of vision is now available in the proximally lighted Hasslinger scope. Figure 3.

Another chief point of difference in the instruments of these two schools lies in the fact that a separate Jackson instrument is necessary for each need as to size and occasionally as to length, while the interchangeable and extension tubes of Brunnings or Hasslinger make this unnecessary. Figure 4. In the matter of technique, the adherents of the Jackson method perform the endoscopic procedures with the patient in the recumbent position with the aid of trained assistants, while the Europeans use the sitting position with the patient on a special chair, or if in a recumbent position, with the aid of a special head rest to adjust the head to a suitable position.

THE CLINICAL APPLICATION OF PERORAL ENDOSCOPY

In all cases of foreign body in the larynx, trachea and bronchi, and in the esophagus, no method other than endoscopic removal is worthy of consideration. Before the perfection of the present day methods, the mortality from these accidents was very high. Today, in skilled hands it has practically been erased. The other clinical

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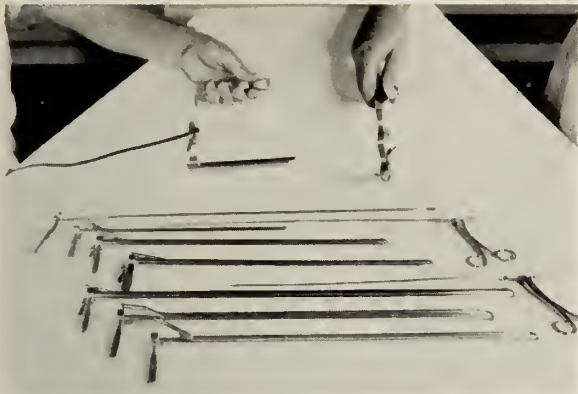


Fig. 1. Jackson Instruments—light but sturdy instruments, simple in construction; a small distal light gives adequate illumination which, however, does not extend much beyond the end of the tube.

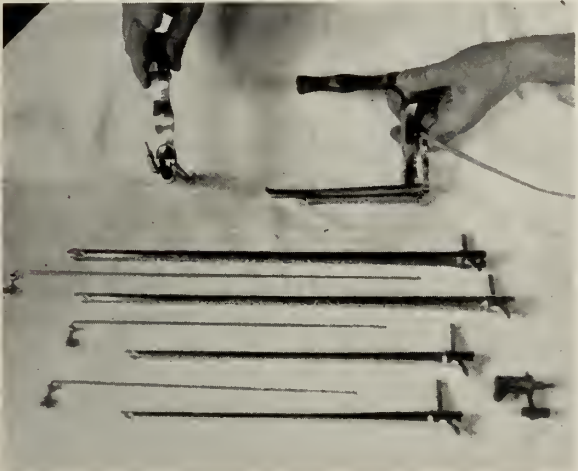


Fig. 2. Negus Instruments (made in England)—modeled after the Jackson type. Twin lights on the laryngoscopes furnish a brilliant illumination. An attachment for the proximal ends of the esophagoscopes and bronchoscopes provides an auxiliary proximal light in addition to the usual lamp carrying rods providing the distal illumination.

indications for the endoscopic study of the larynx, trachea and the bronchi, and the esophagus may be stated as follows: The larynx should be examined by direct inspection through the laryngoscope in all cases of stridor or hoarseness in which mirror laryngoscopy is inadequate. The latter, of course, is unsatisfactory in the infant or very young child. Direct laryngoscopy is a superior method for removing obstructing secretions, for intubation, the removal of certain types of neoplasms, and to test by palpation with a probe the movement of the arytenoid cartilages and explore the ventricle.

Bronchoscopy is now widely employed to study disease. To quote Jackson: "The bronchoscope bears the same relation to intrathoracic disease as the vaginal speculum does to pelvic disease. Specular examination anywhere may be (a) negative, (b) it may demonstrate a condition amenable to treatment by radiation or (c) physical therapy; or (d) it may show a condition that should be dealt with by external surgery."

"The indications for diagnostic bronchoscopy in disease appear very clearly in most instances from a study

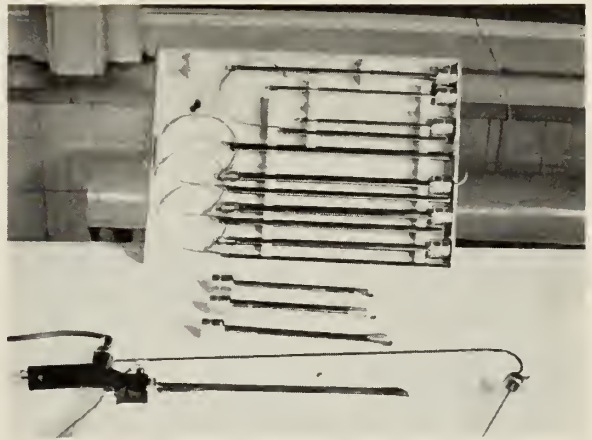


Fig. 3. Hasslinger Instruments—the latest and most improved European type. The various tubes are interchangeable in one electrocope with the proximal light out of the line of vision.

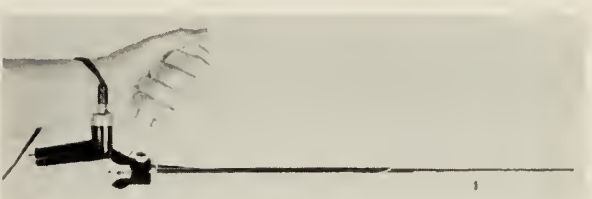


Fig. 4. Hasslinger Scope—assembled for bronchoscopy with an extension tube inserted.

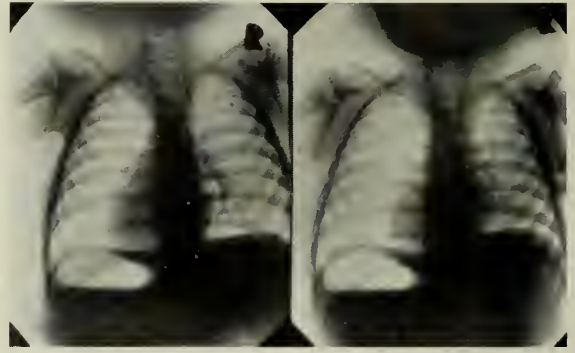
of the particular case; but it is difficult to lay down hard and fast rules on the subject. In a general way, it might be stated that diagnostic bronchoscopy is indicated whenever there is an unsettled diagnostic question. Categorically, the following conditions may be listed among those calling for bronchoscopy:

1. Bronchiectasis.
2. Acute abscess, especially posttonsillectomic and postanesthetic.
3. Postoperative atelectasis (so-called "massive collapse").
4. Any form of bronchial obstruction.
5. Chronic pulmonary abscess.
6. Asthma.
7. Wheezing sound heard at open mouth.
8. Sequelae of war gassing.
9. Unexplained dyspnea.
10. Dyspnea unrelieved by tracheotomy calls for bronchoscopic search for deeper obstruction.
11. Bronchial or tracheal obstruction as indicated by physical or roentgen signs of obstruction emphysema or obstructive atelectasis or by the asthmatoïd wheeze.
12. Obscure thoracic disease.
13. Unexplained hemoptysis.
14. Unexplained cough.
15. Unexplained expectoration of pus, fibrinous casts, mucous plugs, serum, etc.

ILLUSTRATIONS OF TWO TYPES OF FOREIGN BODY IN
THE LOWER RESPIRATORY TRACT



A large metallic foreign body lodged in the trachea ("squawker" from the end of the wooden mouth piece of a toy balloon). An acute emergency. Removed without tracheotomy. The operator must be prepared to do an immediate tracheotomy in this type of case.



A case illustrating a type of "check valve" action of a non-opaque foreign body (peanut) in a bronchus. The peanut plugged the left main bronchus. On inspiration the bronchus enlarged and air entered the left lung to become trapped there causing an emphysema. On expiration the bronchus narrows around the foreign body and air does not escape. The mediastinum shifts to the right on expiration.

16. Question as to the source of spirochetes, fungi, Vincent's or other organisms found in sputum.
17. Conditions requiring selective bronchography as an aid to roentgen ray diagnosis."

Direct visualization of the lumen of the esophagus is indicated in all cases of dysphagia unaccounted for on examination of the oral cavity and pharynx.

I have not mentioned gastroscopy, a method of examination which is becoming increasingly popular, but which to date has not been widely used.

SOME GENERAL CONSIDERATIONS

This discussion is intended as a broad consideration of the practice of peroral endoscopy. It is obvious that two main factors determine the success of the worker in this field, namely, the skill of the operator and the quality of his tools. Neither need any comment.

X-Rays. In examination of the larynx, X-rays are not often used. There have been a number of contributions on this form of laryngeal study which indicate its usefulness in obscure conditions provided one has an X-ray man available who has a special interest in this subject. An X-ray study, preceding the endoscopic examination should always be done in suspected pathology of the trachea and bronchi, and of the esophagus. The interpretation of the X-ray in suspected non-opaque foreign bodies in the bronchi has become almost an exact science through the well known contributions of Manges and Jackson. The "check valve" mechanics of a vegetable foreign body plugging a bronchus is illustrated.

Suspected non-opaque foreign bodies in the esophagus may need the ingestion of a barium capsule for detection.

Anesthesia. Anyone who visits Jackson's clinics is impressed by the ease with which endoscopic procedures are accomplished with almost no anesthesia. A general anesthetic is practically never given. In some cases sedatives may be administered and a small amount of cocaine applied to the pharynx. The confidence of the patient prepared by the simple explanation of what is expected

of him, the absence of distracting noise or movements in the operating room, and the efficient teamwork of trained assistants make these operations look easy and without pain to the patient in skilled hands.

Certain types of patients are much easier to work on than others. The thin asthenic individual, particularly in the older age group, and if he is edentulous, provides the easier type among the adults. The other extreme is offered in the short-necked, obese or muscular type with a hyperactive gag reflex. Infants and small children can be handled satisfactorily under adequate sedation; chloral or nembtal is commonly used. A general anesthetic should never be employed when stridor is present. We avoid the use of codeine or morphine when it is important to preserve the protective action of the cough reflex. Atropine is also avoided in the acute processes in the larynx, trachea and bronchi because of its drying effect on secretions.

SPECIAL PROBLEMS

Foreign bodies in unusual positions or of an unusual type demand special equipment. For example, a pin in the periphery of the lung may call for a biplane fluoroscope; or a small staple with points up may be embedded in granulation tissue and need a special type of protective forceps to engage it. These cases are not emergencies as a rule and the operator must equip himself adequately or transfer the patient to the scene of the proper tools.

The endoscopist must be prepared for emergencies. A tracheotomy set must be immediately available whenever one works on the larynx and bronchi. Occasionally, with certain types of large foreign bodies in the trachea or bronchi, it is wise to remove them through a tracheotomy opening. Otherwise the foreign body may be lost at the glottis on withdrawal, and the risk of asphyxia becomes a real one. A foreign body blocking one main bronchus with an atelectatic lung may become dislodged and be displaced over to the opposite side, with resulting asphyxia. The possibility of these situations must always be kept in mind.

The Rating of Industrial Disabilities*

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RATING of industrial disabilities is an important part of the work of the general practitioner and the industrial surgeon. The circumstances surrounding the care of the men and women injured in industry impose a task upon the attending doctor that can not be treated lightly. There is not a wealth of knowledge available upon the subject of rating disabilities. There are many physicians and surgeons who were practicing their profession before the compensation laws came into effect. The growth of industrial surgery has been very rapid.

It is well for one rating industrial disabilities to keep in mind the purpose of the compensation laws. The following excerpt from a New York Supreme Court decision states concisely the purpose: "The plain purpose of the compensation law is to make the risk of the accident, one of the industry itself, to follow from the fact of the injury, and hence that compensation on account thereof should be treated as an element in the cost of production, added to the cost of the article and borne by the community in general."

The phrase "borne by the community in general" is of prime importance and should be carefully considered. Frequently, individuals and corporations lose sight of this fact and imagine that they bear the burden of the law. In the end the public pays. The purpose of the law postulates the necessity of the doctor to do the rating of disabilities. He is the qualified individual for that function. It is a serious obligation and should be performed with due consideration to the interests of the "community in general."

It is said that doctors disagree in a notorious way. The charge is so frequently made that one is forced to explain, condemn, or defend it. On the old St. Paul court-house there was a large clock. A well known doctor was to testify on the witness stand at 10:00 o'clock of a certain day. This was before the days of taxis and autos. This doctor was hustling to get there in time. He could see from the distance that he inevitably would be late. He rushed up the steps at 10:05 o'clock, breathless, and dashed into the court room, exhausted; he was disgusted to find that the clock on the wall said 9:40 o'clock. There was no one in the court room but an Irish bailiff. He berated the officer for the difference in time between the two clocks, but received this response: "Clocks are like doctors. What would be the sense of having two of them if they agreed?"

The practice should be condemned where it is apparent that it is a travesty on justice. The doctor who viciously mis-states estimations of industrial injuries is a disgrace to his profession. However, his course is short runned, and he soon learns that honesty is the best policy. There is a justification for reasonable, honest difference of opinion. One doctor considers primarily

motion, another thinks of appearance, or some other feature of the disability. No two doctors have had the same past experiences, so they judge the future of the events differently. Men differ in politics, in religion, and in practically every phase of life. A reasonable difference of opinion is a consummation devoutly to be wished.

Indeed, there is much about the Workmen's Compensation Laws to invite differences of opinions. When one studies the schedules for specific injuries in the several states, one finds great differences as to the number of weeks of disability allowed for these injuries. In Rhode Island, 50 weeks are allowed for the loss of an arm, in Oregon, 416, while in Minnesota, 200 weeks are allowed.

The following table is a summary of the number of weeks allowed in the state of Minnesota for various disabilities.

PERMANENT DISABILITY			
Partial permanent	300	4th finger	15
Arm	200	1 1/2 phalanges	Total finger
Hand (wrist)	175	Leg	200
Hand	150	Leg (thigh)	175
Thumb	60	Foot (ankle)	150
1st finger	35	Foot	125
2nd finger	30	Great toe	30
3rd finger	20	Other toes	10
		1 phalanx	1/2 total

With injuries of the type shown above, no difficulty is encountered in rating the disabilities. However, there are an infinite number of injuries in which there is no loss of a member. Fractured skulls, sprained backs, dislocated joints, and broken bones, do not cause the loss of a member, but may cause the loss of the use of the member.

SECTION 40—4274. *Minn. W. C. L.* "In all cases of permanent partial disability it shall be considered that the permanent loss of the use of a member shall be equivalent to and draw the same compensation as the loss of that member; but the compensation in and by said schedule provided, shall be in lieu of all other compensation in such cases, except as otherwise provided by this section."

It is this section that creates the problem of rating industrial disabilities.

Early in the application of the compensation laws it was found necessary to elaborate on the meaning of the words "use" and "function". Moorhead of New York was the first to attempt a method of rating permanent disabilities after fractures. He suggested that these three factors be taken into consideration: anatomical results, functional results, and cosmetic defects. Scudder of Boston pointed out these factors: anatomical, functional, and economic. Those who have taken fracture work at Boston are familiar with the schedule at the Massachusetts General Hospital. The method is extremely valuable in making the final estimates of disabilities.

* Presented at the Northern Minnesota Medical Association meeting at Virginia, August 27, 1937.

A study of leading authorities indicates that the following factors are considered essential in evaluating the loss of function of injured members: (1) reduction of earning capacity, (2) loss of efficiency for specific vocation, (3) structural loss or handicap, (4) cosmetic defects, (5) ability to secure employment. Whatever method one may use to rate a disability, it is usually found that the simpler the method, the better. The average layman cannot understand a complicated system of evaluation and the rating is usually made for his benefit. There is no system that is a good substitute for sound judgment. Doctors rate patients every day. Applicants for life insurance are often surprised at what they think are guesses at height, weight, and age. In fact, few guesses are made, as the doctor is carrying a natural rating process in his estimates of the physical features of the applicant.

Kessler in his book on industrial injuries presents a very practical method for rating disabilities. He bases his method on the proposition that disability of a part is as great as the impairment of the greatest factor of function of the part. He considers three factors as necessary: movement of the part, power of muscles, and coordination and control through the peripheral nerves. McBride uses what he terms a functional measuring rod, composed of one hundred units. On this rod he assigns values to the factor of function in the following way: delayed action—10 per cent, awkwardness—20 per cent, weakness—20 per cent, insecurity—10 per cent, diminished endurance—20 per cent, lowered safety factor—10 per cent, and adverse influence of conspicuous impairment—10 per cent. He states that many examiners may not agree with him on the relative values of the factors concerned. To use his system one would have to make a very thorough study of the disability. His functional measuring rod suggests the consideration of factors of function often overlooked in making estimates.

The committee report of the Minnesota Orthopedic Club presented in *Minnesota Medicine* of February, 1931, is a very practical schedule for rating the disabilities of the extremities, in which the loss of motion is the predominate factor in the disability. No doubt some authorities include factors of function that should be excluded. For instance, the Minnesota law allows 200 weeks for the loss of an arm; no consideration is given to the cosmetic effects or to the adverse influence to re-employment. There is no reason why these two factors should be considered if a workman suffers one-half the function of his arm. The estimate of disability should show the relative work-ability of the injured part as compared with the work-ability of the part before the accident occurred with particular regard to occupation of the injured employe at the time of the accident. Commissions and courts expect doctors to estimate primarily the percentage of the loss of function of a member of the human body.

After one rates an industrial disability, he may be curious to know how his estimates will stand the scrutiny of insurance companies and compensation attorneys. However, he may be a nonconformist, and not care. A busy general practitioner who has just treated a broken

arm may be perplexed by these questions that he must answer in making out his report: (1) How long before the patient will be able to return to work? (2) Will final recovery be complete? (3) If any, what permanent disabilities will or may result from the injury?

He may have previously written to the home office of the insurance company carrying the compensation insurance on the injured employe, and if he did, he is likely to have received a letter like the following:

"In this connection, you are advised that we have not accumulated any statistics on this subject. It would be almost impossible to arrive at any intelligent estimation of the true disability resulting from certain classes of fractures. The period of disability in compensation cases is governed by two factors: first, type of physician treating the case; second, mental attitude of the injured claimant towards his disability, and his inclination to return to work. It would be misleading to give you any statistics on this subject, if we had them, as the statistics as revealed in our compensation files would be entirely different from those accumulated from private practice. In a compensation case, the patient is being paid for his disability, and, I am sorry to say, is often encouraged by his attending physician to prolong his disability. In private practice, the patients make an effort to return to their work as soon as possible and will often carry on and put up with the inconvenience occasioned by a fracture; whereas, the compensation patient expects to be entirely rid of any inconvenience before he returns to his occupation."

To the doctor this reply may seem rather paradoxical. The insurance company expects the questions to be answered and yet no information is volunteered that is of assistance in completing the report. Not satisfied with the above letter, the doctor writes to the Bureau of Statistics of one of the important groups of physicians and surgeons in the country, and receives this reply:

"The Bureau has assembled no recent statistics on fractures. The number of them occurring each year in the United States is variously estimated from one million to one million and a half, rather a wide variance, but I know of no serious attempt to enumerate them accurately. Nor, I might add, do I know of any specific practical value that would attach to such a census."

These replies give little consolation to the attending doctor. He finds that he will have to do the best he can in answering the required questions.

There are tables that may be of more than passing interest to those who wish to read them. The following table was taken from the report of the Committee on Fractures of the American Surgical Association.

TABLE NO. 1

Site of Fracture	Average Disability
Humerus (shoulder)	11.5 wks.
Humerus (shaft)	14.0 wks.
Humerus (elbow)	9.0 wks.
Radius and Ulna shafts	10.8 wks.
Femur neck	8.1 mos.
Femur shaft	7.1 mos.
Tibia and Fibula	4.9 mos.
Ankle	4.9 mos.

The writer submits Table No. 2 as abstracted from current writings and teachings on the subject of fractures.

TABLE No. 2

Site of Fracture	Average Disability
Clavicle	8 wks.
Scapula	10 wks.
Neck of Scapula	14 wks.
Surgical Neck Humerus	10 wks.
Shaft. Humerus	10 wks.
Colles	9 wks.
Forearm	11 wks.
Carpal	16 wks.
Metacarpal	8 wks.
Finger	7 wks.
Neck of Femur	9 mos.
Intertrochanteric	4 mos.
Shaft of Femur	6 mos.
Knee	4 mos.
Patella	3 mos.
Fibula	2 mos.
Tibia and Fibula	too variable
Pott's Fracture	3 mos.
Os Calcis	9 mos.
Tarsal	8 wks.
Metatarsal	3 mos.
Great Toe	7 wks.
Other Toes	4 wks.

The eighth biennial report of the Industrial Commission of Minnesota is very enlightening on the subject of disabilities as they occur in Minnesota. Any doctor reading this report with particular reference to the costs of injuries as they are "borne by the community in general" will be struck by the enormity of the disability problems. There were 54,117 accidents reported by the Industrial Commission in the years 1935 and 1936. The total cost of these accidents was \$8,117,388.00, or an average of \$150.00 a case. The medical expenses reported gave a total of \$1,373,374.00, or an average of \$32.74 per case. The loss of time from industry was 4,838,337 man days. In reviewing the accidental cases, the temporary total disability group is very interesting. In each class of injuries, this is an important group and in most injuries, the major group when disabilities are classed according to the type of disability. For all cases occurring during the years 1935 and 1936 with disabilities extending beyond one week, the temporary total period of disability averaged 33 days, or 5½ weeks, counting six days in a work week.

The following table illustrates a classification of three important kinds of injuries, sprains, dislocations and fractures, arranged according to the type of disability.

Nature and Location of Injury	Grand Total	Fatal, Per Cent	Perm. Total, Per Cent	Perm. Partial, Per Cent	Non-disabling Per Cent	Over 26 Wks., Per Cent	Temp. Total	Temp. Total
							1-25 wks., Per Cent	Ave. No. Wks.
SPRAINS								
All kinds	11,550	.15	.01	1.0	22.0	1.10	67.0	3.3
Arm	1,695			2.5	26.0	.80	61.0	3.0
Hand	150			4.0	30.0	1.30	60.0	2.1
Finger	217			4.1	59.0		35.0	2.1
Leg	2,573	.04	.04	1.8	21.0	.80	73.0	3.0
Foot	318			2.0	25.0	.30	70.0	2.5
DISLOCATIONS								
All kinds	246			11.8	20.0	.80	62.0	5.3
Arm	121			17.0	14.0	.80	62.0	6.5
Finger	50			4.0	48.0		48.0	3.7
Leg	55			10.0	13.0	.20	73.0	6.0
FRACTURES								
All kinds	5,030	4.20	.04	18.0	9.0	3.60	62.0	6.5
Arm	764	.25		25.0	4.0	2.50	64.0	7.5
Hand	240	.25		17.0	28.0		53.0	5.0
Finger	751			43.0	6.0		49.0	4.5
Leg	604	1.50	.30	30.0	.5	1.10	52.0	10.5
Foot	453			15.0	2.2	1.50	80.0	6.7
Toe	704			6.0	9.0	.14	83.0	4.0

The table was prepared by the author with more attempts at multiplication and division than he has had an opportunity to use since he studied arithmetic years ago. During the preparation of this table, he was frequently reminded of the opinions expressed in the letters previously quoted. Yet, he feels that his figuring has not all been in vain. There are features about this chart that are instructive. The percentage of fractures sustaining permanent partial disability is an important consideration. Fractures, as a class, sustained 18 per cent permanent partial disability. Forty-three per cent of fractures of the finger sustained permanent partial disability. A glance at the column representing the temporary total group shows that the greatest portion of disabilities fall in this column. The last column represents the average number of weeks of temporary total disability in the injuries studied. It is surprising to find that the time lost is not greater than indicated. This is undoubtedly accounted for by the fact that the injured employe is frequently given work that does not require much use of the injured part. This, of course, is a laudable practice.

The table is not offered as a method of value in showing how to evaluate disabilities, but rather to indicate how disabilities have been evaluated in Minnesota during the years 1935 and 1936. To the general practitioner, curious to know how estimates are made by his fellow practitioner, it is a guide to consider. It will warn him of the possibilities of permanent partial disability and also indicate to him what he may expect the disability to be in the majority of cases. Any improvement that he can make in reducing the period of disability in his private practice will be an admirable contribution in lessening the load of expense "borne by the community in general."

It is necessary for the surgeon who rates an industrial injury to have a good history of the accident. In most cases, the attending surgeon has such a history, as he has followed the course of the case up to the time that estimating is done. It is essential to know whether any previous accident or disease, or any existing concurrent disease contributes to the present disability. The medical man must always remember that he is the doctor taking the history of the case and not an investigator determining the compensability of the case. The examination should be complete and painstaking. It sounds like an adventitious recommendation to point out that details of inspection, palpation, manipulation, and measurement should be observed. The examining surgeon can arrive at sound conclusions with few instruments of precision in many cases, yet measurements carefully made and recorded are extremely valuable in every case. X-ray examinations in cases of fractures and dislocations are indispensable. All measurements and findings of the injured member should be compared with the uninjured member. Many surgeons of experience have never thought of Kessler, McBride, or other writers on the subject, and probably never will use any method other than the one they have been using. The writer's purpose is to point out factors that are important in function so that guessing will not be necessary.

The general practitioner should not try to evade the duty of evaluating industrial disabilities. He should remember that the law does not demand that the rating be done according to any particular system, or to the teaching of any particular authority. He should keep in mind that in every disability there are factors that are imponderable, immeasurable and intangible. Schedules in vogue should be used as guides and not as dictators in evaluating disabilities.

There are three good reasons why a medical man should do a good job of estimating disabilities. Usually one good reason is sufficient. The first reason is that the injured person should be given all the benefit that the law of Minnesota intended him to have under the compensation act. The physician owes it to his patient to see that an accurate estimate of disability is made. Sec-

only, when a laborer is disabled, he sustains an individual loss, and society sustains a loss; that is, "We, the people" sustain a loss, and "We, the people" are greatly concerned when a laborer is injured. As medical experts, we have a serious duty to perform when we estimate the disability sustained by a laboring man. The third reason why a medical man should be a good judge of industrial disabilities concerns his professional reputation. Henry Clay said he would rather be right than president. Every doctor is happy when he finds that his estimations have been declared satisfactory. Every doctor should feel chagrined when he finds that his estimations have been declared to be at variance with ordinary common sense. Every doctor should be proud to say, "I would rather be right than be the surgeon of the biggest insurance company in the world."

The Hard of Hearing Problem in a Student Health Service

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FOR many years student health services in colleges and universities have been confronted with the problem of the early recognition and adjustment of that fairly large percentage of students having some grade of real or apparent hearing impairment. In practically all instances, the watch-tick test has been the method employed for testing hearing acuity. A few cases were picked up in this manner. Extraneous noises, lack of uniformity in the type of watch used for the test, and the judgment of the tester were variable factors. The audiometric estimate of hearing impairment using the phonograph type of instrument was an improvement. Standards were more accurate, but the variable factor of extraneous noises was not completely excluded, and although many more cases were discovered, we did not then have a complete picture of the situation. The usual disposition of such cases was either to have the handicapped student occupy a front row seat, or learn lip reading, or obtain a hearing aid of some sort, often without a full understanding of the exact background of the difficulty.

In the Student Health Service at Syracuse University, the above methods were followed for several years. As a result, only gross hearing impairments were discovered and data obtained from year to year were not comparable. During the past college year an attempt was made to approach the students' hearing problem in a more scientific fashion and to begin the assembling of more accurate data both as a basis for advice to those with a hearing defect and to get a more nearly complete picture of the hard of hearing problem among college students.

At present the routine followed begins with a group audiometer test using the Western Electric 4B apparatus. This group testing is done by an experienced nurse-operator. The tests are conducted in the sound-proof laboratory of the University Radio Work Shop and are a part of the entrance physical examination required of all new students. By means of the "screening test" with the 4B instrument, a list of students with hearing difficulties is obtained for later careful examination. Inasmuch as speech and hearing are closely related, the Department of Speech in the University also coöperates by referring students with speech impairments in whom pathology of the ear or voice producing organs is suspected. In this way, a good number of students is made available for careful study during the year.

The further study of the cases is done by an otolaryngologist. A permanent record form has been drawn up, the general plan of which follows that used by the Board of Education of the City of New York. In addition special attention is paid to the voice producing organs. A brief but pointed history is obtained referable to the patient's complaint of either hearing or speech impairment or both. The physical examination includes the customary ear, nose, throat and laryngeal examination, but the viewpoint of speech and hearing are of prime interest. It is as essential for the speech teacher to know the size, shape and possible function of the various voice producing and resonating spaces, as it is for the otologist to know the condition of the Eustachian tubes. Whispered voice, spoken voice, Schwabach, Weber and Rinne tests are made. The hearing is checked further for tonal or island hearing impairment by testing with a Western Electric 6A Audiometer. It is not the aim of the pres-

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ent report to give statistics obtained to date. These will be presented in a separate paper. It should be said, however, that this program is uncovering many difficulties of hearing and speech which have in the past received little or no attention because they remained undiagnosed in the average student.

To obviate any conflict with local otolaryngologists, our efforts have been limited to diagnosis. No treatment is given. References to local specialists are made for necessary treatment at the student's expense.

The enthusiastic response on the part of all those concerned leads us to believe that the added effort expended upon this group of college students is much appreciated. We believe, also, that with the examination of several thousand students, useful information will be obtained which may aid in lessening the number and severity of cases of impaired hearing and speech. In any event, the limits of the hard of hearing problem among college students will be more definitely marked out.

RECORD FORM

NAME _____ AGE _____ COLLEGE _____ YEAR _____

Hearing Loss (4A) R _____ L _____

Impairment Known? _____ Onset _____

Attributed to _____

Earache _____

Discharge _____

Tinnitus _____ Character _____

Vertigo _____ Nausea _____ Headache _____

Affected by Weather _____ Colds _____

Others _____

Treatment _____ Character _____

Tonsils & Adenoids Removed _____

Effect on Deafness _____ Colds _____

Sore Throats _____ Tinnitus _____

General Health _____

Allergy _____

Consanguinity _____

Members of Family with Affected Hearing _____

General Health _____

Tobacco _____ Drugs _____

Illnesses _____

Impression _____

Nose:

Size & Shape _____

Mucosa _____

Turbinates _____

Discharge _____

Septum _____

Sinuses _____

Nasopharynx:

Size & Shape _____

Adenoids _____

Turbinates _____

Eustachian Orifices _____

Mouth & Oropharynx:

Size & Shape _____

Lips _____

Teeth _____

Tongue _____

Pillars _____

Tonsils—Faucial _____

Lingual _____

Palate _____

Uvula _____

Post. Wall _____

Cervical Glands _____

Larynx:

Size & Shape _____

Epiglottis _____

Cords—False _____

True _____

Action _____

Interarytenoid Region _____

Arytenoids, etc. _____

Ears: _____ R _____ L _____

Ext. Canal _____

P.A. Region _____

Membrana Tympani

Shrapnell's _____

Color _____

Scars _____

Position _____

Perforations _____

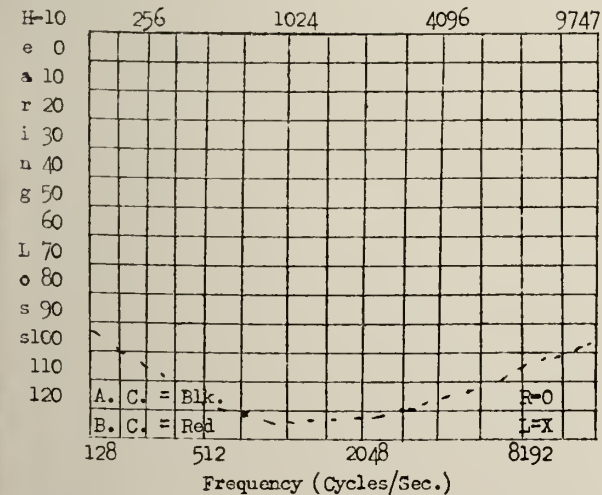
Others _____

W. V. _____

S. V. _____

Schwabach _____ Weber _____

Rinne _____



Disposition _____

Progress _____

Old Tuberculin and Purified Protein Derivative of Tuberculin*

A Comparative Study as Reviewed from Recent Literature

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THE aim of this paper is to take up the development of Purified Protein Derivative of Tuberculin (PPD), and to attempt to evaluate its merits as an agent in skin testing to detect tuberculous infection and to attempt to compare this newer product with Koch's Old Tuberculin. This information has been obtained from reviewing recent literature in this field.

An increased interest during the past decade in the use of tuberculin in group-testing of large numbers of individuals during all ages of life, as found in schools and institutions, has led to the desire to establish a standard tuberculin of known potency, so that accurate comparisons of results obtained in different sections of the country can be made. After much experimentation, it is generally agreed that the Mantoux technic of tuberculin testing is to be preferred to other methods. However, it was not until 1932 that the inherent difficulties of preparing a standard tuberculin of known potency were overcome. In that year, Seibert and Munday described a most satisfactory and practical method for isolating the active principle responsible for the tuberculin skin reaction. This product was called Purified Protein Derivative of Tuberculin. Its full value is still not completely established, but its apparent value is becoming more impressive. This substance has been developed with the intent of replacing Old Tuberculin, in that this latter biological from various laboratories, does not always have the same strength. For many years, dilutions of Koch's Old Tuberculin have been used, but this product lacked, to a certain degree, the three cardinal requirements of an ideal substance for tuberculin testing; viz., that it be (1) reasonably stable in diluted form, (2) reproducible in exact strength, and (3) non-sensitizing to the individual being tested. Also certain inherent and technical factors in its preparation, dilution, and administration prevent accurate comparative analyses of this older product in evaluating its use. This prompted the development of PPD by Dr. Florence B. Seibert of the Henry Phipps Institute, under sponsorship of the National Tuberculosis Association.

In view of the long time Old Tuberculin has been in general usage, the question arises if Old Tuberculin itself can not be put on a standard basis. This is, however, hardly possible. Old Tuberculin is not a unit substance but a mixture of extreme complexity. Obviously, the absolute specificity of a tuberculin containing protein derivative from beef or milk peptone can not be guaranteed. Furthermore, in all probability, the actual content of active principle is never the same in successive lots. According to Long and Seibert¹ it is, therefore, evident that the only sure way to secure equally potent tuberculins is to make them from the active principle itself. Thus the question arises: Is it possible to secure

* Presented before the Medical Staff of the Lymanhurst Health Center, Minneapolis, April 26, 1938.

the active principle in pure form, so that solutions of equal strength can be prepared?

The first problem which had to be worked out was to provide a common constant medium on which to grow the tubercle bacilli, a medium free from foreign protein substance and by preference a medium free of color. Such a medium has been developed which is of a non-protein nature of known chemical composition, suitable for reproduction of tubercle bacilli in large quantities. The medium developed by Seibert² does not use substances of an undefined chemical composition, such as proteose or peptone, nor any vitamins. It is similar to the medium used by the Bureau of Animal Industry in the preparation of their synthetic medium tuberculin. This medium of Seibert will permit growth equal to the maximum obtained in glycerolated beef bouillon.

The formula for this medium on which tubercle bacilli are grown is as follows:

1-asparagine	14.00 gms.
Dipotassium Phosphate C. P.	1.80 gms.
Sodium Citrate C. P.	0.90 gms.
Magnesium Sulfate C. P.	1.50 gms.
Ferric Citrate (U. S. P. VIII) Scales	.30 gms.
Dextrose of the grade known as Cerelose	10.00 gms.
Glycerol	100.00 gms.
Water q. s. ad	1000.00 gms.
pH	7.0

This medium in the flasks is sterilized by a single exposure to steam under ten to 12 pounds pressure for 25 minutes. The tubercle bacilli are grown on the surface for eight weeks at 37° C. and should yield as an average 1.85 Gm. of dried organisms per 100 cc. of the medium.

Much effort has been put forth in attempting to separate and identify the active substance, which causes a skin reaction in tuberculous infected individuals and not in normal individuals. In attempting to isolate from the medium the substance which gives the tuberculin skin reaction, it was soon recognized that the only reagents which impaired the activity of the tuberculin could be grouped as true protein precipitants. It may, therefore, be tentatively concluded that the reaction producing material is a protein or allied with a protein. The origin of this protein is not known; whether it is excreted during the metabolism of the bacteria or whether it is extracted from the bacilli during their growth, or after death by the medium, are questions still open for investigation. It has been found, however, that the protein fraction is probably produced by all strains of tubercle bacilli but in different quantity by various strains.

The believed active principle of tuberculin has been isolated and purified by Seibert.² There are two main steps in the isolation of PPD. After a liquid tuberculin analogous to Old Tuberculin has been obtained from the synthetic medium, it is subjected to the process of ultrafiltration. In the course of this procedure, all unutilized constituents of the original medium as well as

metabolites of small molecular size are filtered off, final traces being removed by the repeated addition of phenolized distilled water in the apparatus. The Purified Protein Derivative, which is colloidal, and a considerable amount of colloidal polysaccharide, inactive in the tuberculin test, remain behind. The Protein Derivative is then precipitated by addition of a definite amount of trichloroacetic acid solution. In the final step, ether is used to remove the acid, and a dry powder results. The chemical and physical properties indicate it to be a product of protein nature of low molecular weight. It is claimed by Seibert to be non-antigenic in that it does not sensitize or lead to antibody formation, but it is as highly potent and specific in the tuberculin skin test as the proteins of higher molecular weight, contained in Old Tuberculin, which are typical antigenic substances.

The product so obtained can be used in solutions of accurately weighed amounts, or it can be incorporated with a soluble inert substance like lactose, and made into dry tablets as described by Clark and Reichel.³ Each tablet is made up so that when dissolved, 0.1 cc. of the appropriate solution is the required dose. (Each tablet is made ten times stronger than the necessary strength.) Tablets are also supplied for group testing. The use of these tablets seems to obviate many of the difficulties inherent in the use of the Old Tuberculin. In the tablet form, the material is in the dry state, thus insuring stability and maintenance of strength. The tablets of tuberculin PPD usually carry a five years' dating. When solutions of dissolved protein derivative are made, only freshly prepared solutions should be used as dilutions of tuberculin of this type deteriorate in a short time. From the work done by Long and Seibert, presumably the length of time it is safe to use PPD in diluted solution is three days if it is kept in a refrigerator. For convenience of testing, the tablets used are dispensed in two dosages. The smallest sized tablet contains 0.0002 mg. of PPD for the first test dose and 0.05 mg. for the second test dose. A vial-ampoule of sterile buffered salt diluent with a pH of 7.4 is supplied with each tablet. This enables a convenient mode of administration of the doses recommended. The National Tuberculosis Association has approved Purified Protein Derivative usage in a two dose technic and usage in these dosages in testing of large numbers of individuals.

For the first test, 0.1 cc. of the diluted PPD containing 0.00002 mg. is injected into the skin over the flexor surface of the forearm at a point about 4 to 5 cm. below the bend of the elbow. The technic is the same as that used in Mantoux testing of tuberculosis. The site of the injection is examined 48 hours later; and if no reaction is noted, 0.1 cc. of the second-strength dilution containing 0.005 mg. of PPD is injected. If after 48 hours there is still no reaction, the person is considered negative to tuberculin. It may be noted here that the first dose of the Purified Protein Derivative recommended, 0.00002 mg., is equivalent to 0.002 to 0.01 mg. of Koch's Old Tuberculin. The second dose of 0.005 mg. is approximately equivalent to 1.0 mg. of Old Tuberculin (1—100 dilution).

In reading and grading reactions, the area of redness, area and height of inflammatory edema, and the pres-

ence of lymphangitis, blanching, vesiculation, necrosis or ecchymosis, form the basis for grading the tests. Rarely there may be some systemic reaction such as fever, headache, backache, or malaise. Severe reactions, if they occur, are always the result of the first dose. Positive reactions may be arbitrarily classified as one, two, three, or four plus depending upon the extent of edema measured at its widest diameters. Grading according to the method of Aronson⁴ seems to be fairly well established (Table 1). One plus represents an area of erythema or erythematous infiltration from 5 to 10 mm. in diameter; two plus, an area of redness and edema from 10 to 20 mm. in diameter; three plus, an area of reaction exceeding 20 mm. in diameter; and four plus, an area of reaction exceeding 20 mm. with marked redness, edema, and necrosis.

TABLE 1.
Interpretation of Mantoux Tests with PPD

Grade of Reaction	Size of Reaction (Redness & Edema)
Negative	No edema
1+ or +	5—10 mm. in diameter
2+ or ++	10—20 mm. in diameter
3+ or +++	exceeding 20 mm. in diameter
4+ or ++++	exceeding 20 mm. plus definite necrosis

During 1934 and 1935 approximately 150,000 doses of the Purified Protein Derivative of Tuberculin were distributed through the auspices of the National Tuberculosis Association and its affiliates. To date it has not been possible to secure returns on all the tests performed with this material, but about 60,000 records have been turned in and are being analyzed at the present time. In addition, records of about 35,000 tests are available in which the test was performed with accuracy and the ages of those tested and the percentage of reactors and non-reactors were recorded. The majority of surveys with PPD have been supplemented to some degree with X-ray studies. The usual procedure has been to X-ray only the positive reactors, though a few studies have been made in which all the reactors and non-reactors are X-rayed. Further studies of this complete character are desirable. More often the reactors and a certain unselected portion of the non-reactors are X-rayed. In general, investigations of this general character have yielded few positive X-ray films in the presence of a negative reaction to the Purified Protein Derivative. Occasionally thoroughly calcified lesions are found in cases in which the reaction to PPD is quite negative.

One of the largest series so far reported is that of Deegan⁹ who tested and X-rayed 3,029 individuals who had been referred to the itinerant chest clinics of New York State Department of Health because of a history of contact with a known case of tuberculosis or because of symptoms referable to the chest (Table 2). Females predominated slightly in this group.

TABLE 2.
Analysis of Individuals with Abnormal X-ray Findings According to Purified Protein Derivative Reaction and Diagnosis (Deegan)

3,029 Patients Tested.			
1,480 Positive Reactors.			
269 Individuals revealed X-ray evidence of tuberculosis.			
	Tested	Reactors	PPD Failed
Pulmonary Tuberculosis	32	31	1
Healed Tuberculosis	237	227	10
Total X-ray Positive	269	258	11
96% reacted positively to 0.001 mgm. Purified Protein Derivative.			

Thus only one case of active tuberculosis and ten cases of healed tuberculosis failed to be picked up by a dosage of 0.001 mg. of Purified Protein Derivative of Tuberculin.

Long and Seibert⁶ tested 1,867 white and colored patients entering the Henry Phipps Institute for the first time during 1934 and 1935. Not all the patients were X-rayed, as it was felt in many cases there was no indication for it. X-rays were taken of 727 positive reactors in whom there was some reason to suspect the presence of tuberculosis. Of these, 488 were diagnosed as X-ray positive for tuberculosis. In addition, 30 clinic patients negative to PPD, but in whom there was some reason to consider tuberculosis, were X-rayed. Ten of these were diagnosed as having active, latent, or suspected tuberculosis of adult type or childhood type lesions with calcification. Of these, there were two suspected apical, three latent apical, one far advanced case, two active childhood type, and two calcified childhood type. Thus only two per cent of the cases were missed with Purified Protein Derivative (Table 3). In this study, six cases

TABLE 3.

Diagnostic Value of Purified Protein Derivative in Active and Latent Tuberculosis (Long and Seibert)

	No. of Patients	Positive to 0.00002 mg.	Negative to 0.00002 mg.; Positive to .005 mg.	Negative to Both Doses
Total Cases Tested				
With PPD	1867			
X-Ray Positive	498	458	30	10
Minimal	35	34	1	0
Moderately Advanced	105	102	3	0
Far Advanced	127	122	4	1
Latent Apical	104	88	13	3
Suspected Apical	30	24	4	2
Acute Childhood type	14	10	2	2
Calc. Childhood type	83	78	3	2
Totals	498	458	30	10
Totals in Per Cent		92	6	2

of non-pulmonary tuberculosis were picked up, all of which reacted to the first dose of PPD. Of the 488 positive to both PPD and X-ray, 458 or 92 per cent were positive to the first dose (0.00002 mg.). In summary of this work, it can be said that in this series very few cases of clinical significance were missed by PPD.

Another study reported by Plunkett and Siegal⁷ was carried out on 1,747 inmates of the Newark State School for the Feeble-Minded in New York who were tested with Purified Protein Derivative. Positive reactors were X-rayed in an attempt to obtain a satisfactory one test dose of PPD. The patients were tested with 0.00002 mg. PPD on one arm and 0.004 mg. Old Tuberculin on the other arm. Subsequently, with the exception of 476 severe reactors, all were retested in a similar manner with PPD and Old Tuberculin 25 times the strength of the first dose, viz., 0.0005 mg. PPD and 0.1 mg. Old Tuberculin. All negative reactors of the second test were then tested a third time with 0.005 mg. of PPD and 1.0 mg. Old Tuberculin. Retesting was done at an interval of one week. Tests were read in 48 hours. Females predominated two to one—ages 3 to 70 years, of mostly American, Polish, and Italian descent. (Table 4.)

TABLE 4.
Comparison of PPD and Old Tuberculin. Number of Reactors in Each Group. Newark State School (Plunkett & Siegal)

Total Number Tested, 1747.	Number Positive	Cumulative Perc. Reactors of Total Tested	Cumulative Perc. Reactors of Total Reactors
First Test:			
PPD — 0.00002 mg.	777	44.5	72.6
O. T. — 0.004 mg.	314	18.0	29.5
Cases reacting to PPD and not to O. T.	463		
Second Test:			
Add'n Positives—			
PPD — 0.002 mg.	217	56.9	93.
O. T. — 0.1 mg.	633	54.2	88.6
Cases reacting to PPD and not to O. T.	47		
Third Test:			
Add'n Positives—			
PPD — 0.005 mg.	75	61.2	100.
O. T. — 1.0 mg.	108	60.4	98.7
Cases reacting to PPD and not to O. T.	14		
Total Reactors, PPD	1069	100.	
Total Reactors, O. T.	1055	98.7	

From Table 4 it will be noted that the first dose of Purified Protein Derivative discovered 72.6 per cent of all the reactors as compared to 29.5 per cent with the first dose of Old Tuberculin. Throughout the entire study there was an apparent relationship between the quantitative and qualitative results obtained from different tests. Plunkett and Siegal state, "Thus in the first series of tests, there were two and one-half times as many reactors with PPD as with Old Tuberculin, and at the same time the percentage of three and four plus reactors with PPD was two and one-half times as great as the percentage of three and four plus reactors with Old Tuberculin."

Of the 1,069 positive reactors, 140 individuals demonstrated X-ray findings. Of this 140 found positive for tuberculosis by X-ray, 138 of these or 98.6 per cent were detected by either the first (0.00002 mg.) or the intermediate dose (0.0005 mg.) of PPD. Of these, 123 (89.1 per cent) reacted to the first dose and 15 (10.9 per cent) to the intermediate dose. The remaining two cases were examples of calcified primary tuberculosis, which required the full test dose to elicit.

It is apparent from these data that although most cases are found with the first small dose of PPD, the use of the second dose is still advisable in that a few important cases of progressive tuberculosis are discovered; and second, that cases of infection not clinically important at the moment, but significant as evidence of more or less serious contact are uncovered. In surveys of children, the importance of this infected but less sensitive group becomes apparent.

Law's¹⁰ study was done with 732 children of low economic status who came from households distributed in towns throughout two-thirds of the state of Michigan. They had been hospitalized for the commoner types of medical and surgical diseases. No separation of tuberculous suspects, contacts or those with clinical tuberculosis were made. Suitable physical condition and a temperature under 101° F. were the criteria in selection of patients. Purified Protein Derivative (0.00002 mg.) was applied on the left arm and Old Tuberculin (1—10,

000) on the right arm. Tests were read after 72 hours and if negative, the patients were injected with PPD, 0.005 mg. and Old Tuberculin. Table 5.

TABLE 5.

Comparative Analysis of Old Tuberculin and Purified Protein Derivative in Two Studies

Age of group Tuberculin Tested	Law 0—14 732		Plunkett & Siegal 0—45+ 1747	
	O. T.	PPD	O. T.	PPD
Positive to 0.00002 mg. PPD				
Add'n Pos. to 0.005 mg. PPD		63		777
Pos. to 0.01 mg. O. T.		17		292
Pos. to 0.004 mg. O. T.	29		314	
Add'n Pos. to 0.1 mg. O. T.	25		633	
Add'n Pos. to 1.0 mg. O. T.	1		108	
Total Positive	55	80	1055	1069
Per Cent Positive of Total Tested	7.2	12.0	60.4	61.2

The difficulty of getting patients to return for second examinations and limitation of the examiner's time has prompted many physicians to seek a single test dose of tuberculin that will detect all of the clinically significant cases and all of the significant contact cases, and at the same time not cause a high percentage of marked reactions. Such an idea was advanced by Plunkett and Siegal⁷ who, on the basis of their studies, concluded that more study is needed to select an optimum one test dose of PPD and that this may be less than 0.0005 mg.

The numerous tests of the standard dose (0.005 mg.) that have been made show that in communities of low incidence of infection few severe reactions were observed, but in some series made in other areas, the percentage of 4+ reactions with this dose of testing substance has been very high. Thus Long and Seibert⁶ conclude that "what is safe for one part of the country is not safe for all parts." In attempting to determine an intermediate dose of PPD which might satisfy the needs set up, one can again observe Deegan's recent work in the itinerant Chest Clinic of the Division of Tuberculosis of New York State Department of Health. Here a single dose of 0.001 mg. of PPD, that is 1/5 of the second standard dose, was used. Of 3,029 persons tested, 49 per cent reacted to this dose. The subjects tested were X-rayed at the same time, and the effectiveness of this dose of PPD was shown by the fact that 96 per cent of those positive to X-ray responded to this dose. An occasional case of active pulmonary tuberculosis and a small percentage of cases of healed tuberculosis with calcified lymph nodes, however, require the full second dose for the production of a positive reaction. With this dose of PPD (0.001 mg.), moreover, Deegan⁹ observed a high percentage of 4+ reactions. Eleven per cent of all reactions were recorded as 4+, the figures being 8.3 per cent of the total reactors for the contact group and 2.9 per cent for the non-contacts.

In Plunkett and Siegal's⁷ series, no definite percentage of 4+ reactors was stated, but in the first testing with 0.00002 mg., 467 patients gave such severe reactions no further testing was done on them. In Law's study 36.3 per cent of total reactors showed a 3+ or 4+ reaction, using the two test dose of PPD.

TABLE 6

Summarized Comparisons of Intensity of Reactions with Purified Protein Derivative in Two Studies

	LAW 732 White Children Tested. 80 Reactors. Dose: (0.00002 mg. PPD) (0.005 mg. PPD).		DEEGAN 3029 Tested. 32 Cases of Active Pul- monary Tuberculosis. Dose: (0.001 mg. PPD).	
	Number	Per Cent	Number	Per Cent
Negative			1	
1+	10	12.5	7	22.
2+	41	51.1	12	37.5
3+	27	33.8	9	28.1
4+	2	(2.5)	3	(37.5%) 9.4

It is stated by Long and Seibert⁶, "While present studies have been inconclusive, it seems unwise to use as high a dose as 0.0005 mg. in random testing throughout the United States, such as the East, where the incidence of tuberculosis and the corresponding number of close contacts is relatively high." Here a smaller dose would be required than farther to the West, exclusive of the zones which have attracted considerable numbers of tuberculosis patients. More work must be done in this field to establish a single test dose. It is the opinion of Long and Seibert that this will be about 0.0002 mg.

Although the intracutaneous method is preferable to the "scratch" test (Pirquet), there are circumstances such as parental objection to "injections" when the Pirquet may be used advantageously. Such a study was done by Steele and Willis.¹² They applied PPD and Old Tuberculin by Von Pirquet technic. Then Purified Protein and Old Tuberculin were applied to 67 unselected non-reactors of the Pirquet tested group above using Mantoux technic.

TABLE 7.

Validity of Von Pirquet Test with O. T. and PPD (Steele and Willis)

Children 10—15 years.	
Tested	226
Reacted with O. T.	34 (15%)
Reacted with PPD (10 mg./cc.)	28 (12.7%)
Non-reactors tested by Mantoux technic	67
Reacted with O. T. (1—1000)	4 (6%)
Reacted with PPD (0.05 mg./cc.)	4 (6%)

Thus it was their conclusion that PPD could be used satisfactorily by the Pirquet method when used in a strength of 10 mg./cc. The degree of reaction is the same as with undiluted Old Tuberculin. This series is, however, rather small to permit of very definite conclusions.

It is well known that extremely ill patients and a considerable number of patients with chronic far advanced tuberculosis of long standing may not react to tuberculin. This holds for Purified Protein Derivative as well as tuberculin in other forms. These results also conform to those of Ayman,⁸ who found that "the poor reactors were almost invariably advanced or moribund cases."

SUMMARY

1. Purified Protein Derivative is reasonably stable in diluted form, reproducible in exact strength, and non-sensitizing.

2. Tuberculin Purified Protein Derivative is a dry powder and can be kept in this state for comparatively long periods of time (5 years). Solution of PPD can be used for a period of three days if kept in a refrigerator.

3. PPD does not contain extraneous proteins, obviating the possibility of sensitization, and accounting for its specificity and accuracy.

4. The technic of testing with PPD is exactly the same as intradermal (Mantoux) testing with Old Tuberculin.

5. The first test dose of PPD (0.00002 mg.) repeatedly finds more reactors than did Old Tuberculin (1—10,000).

6. The second test dose finds practically 98 per cent of all cases as determined by X-ray.

7. The smaller dose of PPD is not standardized to the higher dilutions of Old Tuberculin.

8. The possibility of the use of Purified Protein Derivative in a one test dose in certain less concentrated tuberculosis infected areas without severe reactions in tested individuals is suggested, but the optimum dose has not yet been determined.

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Basal Anesthesia with Sigmodal

A Preliminary Report

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THE intensive research of the past decade in the field of pre-anesthesia has served not only to establish the rationale of basal anesthesia itself, but also to define the properties which the ideal pre-anesthetic medication must possess. Thus it must assure:

1. Absolute safety for the patient,
2. Simple administration,
3. Elimination of psychic trauma,
4. Attainment of quieter and smoother narcosis,
5. Considerable saving of inhalant anesthetic,
6. Fewer respiratory complications,
7. Fewer disturbances of peristalsis,
8. Complete amnesia for the day of the operation, and
9. Diminution of the dose of postoperative narcotics.

A drug which in the author's opinion closely approaches the ideal has been found in sigmodal, a rectally administered barbiturate, sodium-amyl-beta-bromallyl-malonyl-urea. Sigmodal is not an anesthetic but a hypnotic. It is rapidly destroyed in the liver. Its prompt hypnotic action is due to the presence of an asymmetric carbon atom.

Sigmodal was introduced in this country by Emmert and Goldschmidt¹ who reported their first experiences at the American Medical Association meeting in Kansas City in 1936, published in the *Journal* of the American Medical Association in November, 1936, after a preliminary report² in October of the same year. Sigmodal is marketed in a 10 per cent solution (stabilized in 10 per cent antipyrine), ready for immediate use. It is administered rectally, is rapidly absorbed, and exerts no irritating effect on the rectal mucosa. The authors used the drug in 200 obstetrical cases without any deleterious effect on mother or child.³ They emphasized as an additional advantage of sigmodal that sigmodal sleep can be interrupted instantly, at any time, by intravenous administration of from 3 to 5 cc. of coramine or metrazol.

My experiences with sigmodal as a basal anesthetic cover a period of two years and a series of 125 surgical cases; 63 of these were minor and 62 major operations, in 115 female and 10 male patients, ranging in age from 11 to 79 years. The routine preoperative preparation is as follows: On the evening preceding the operation, the patient receives an enema and 3 grains of pentobarbital or phenobarbital. Two hours before surgery another enema is given to assure an empty sigmoid; one hour later

the patient receives 1/6 grain of morphine and 1/150 grain of atropine; 15 minutes thereafter sigmodal is administered rectally. For this purpose, the patient is placed on the left side and a thin, sufficiently lubricated rubber catheter which fits exactly on a 10 cc. Luer syringe, is inserted into the rectum as high as possible. From 5 to 8 cc. of sigmodal solution is then instilled through the catheter, followed by 5 cc. of tap water. The catheter is removed and pressure is exerted on the anus for several minutes.

The patient is then placed in a comfortable position. The window shades are lowered, the room darkened, and the ears of the patient are plugged with cotton; all disturbances and noises are carefully avoided. After 15 minutes, the patient shows increasing signs of drowsiness and falls into sleep after 25 to 30 minutes. The maximal depth of sleep is reached after 45 minutes, when the patient is moved to the operating room. Usually the patient is in deep sleep at this time; this applies especially to women; male patients in some instances, however, are somewhat less affected; but in all cases complete amnesia is obtained.

The dosage of sigmodal depends on the sex, age, and weight of the patient. Normally, adult men under 60 receive 8 cc., women between 16 and 60 years as a rule 7 cc., while to patients under 15 and over 60 years not more than 5 or maximally 6 cc. are given. Generally, the dose should not exceed 1.3 cc. per 10 kilo of body weight. In my series, the following additional inhalant anesthetics have been used: ether, mostly in open drop method; ethylene, and vinethene. Two patients were operated under combination of basal and spinal anesthesia. In 15 cases local anesthesia was used in addition to basal anesthesia; 7 of these required small amounts of ether while the peritoneum was opened.

The inhalation anesthesia is started when the surgeon is almost ready for work. There is no struggle against the anesthetic, no excitation; the required depth of anesthesia and complete relaxation are reached within a few minutes. The saving in inhalant anesthetic is considerable, preventing complications from affections of the lungs.

The reaction of pulse, blood pressure, and respiration to sigmodal sleep has been carefully studied. The pulse as a rule was unchanged. Respiration in some instances was somewhat shallower but regular and not accelerated. The blood pressure remained practically unchanged in about half of the cases; the rest of them showed a drop in blood pressure of about 10 points, except in two patients with hypertension, where a drop of 30 points was observed. The complexion of the patient during sigmodal sleep varies from pink to a slight flush. In abdominal operations, the inhalation anesthesia may be terminated as soon as the peritoneum is closed; in most instances the depth of sigmodal sleep suffices for the closing of the abdominal wall.

The postoperative after-sleep normally lasts from 4 to 8 hours. In some instances the duration of the sigmodal after-sleep was prolonged to 12 hours without any ill effect. The after-sleep is considered of definite advantage because it reduces the required amount of

postoperative narcotics. Thus unnecessary depression of the respiratory center is avoided. This non-interference with the respiratory center and the absence of irritation of the bronchi (since only small amounts of inhalant anesthetics are used) undoubtedly accounts for the fact that no complications from affections of the lungs occurred in the series. In this connection it may be mentioned that one of the patients, 74 years old, suffering from bronchitis, was operated on for a ruptured appendix; the only postoperative complication was an abscess of the abdominal wall.

During the postoperative sigmodal sleep, hypodermoclysis or venoclysis can be administered without molesting the patient. One is under the distinct impression that the onset of normal kidney function after sigmodal anesthesia occurs unusually early. The reduced amount of postoperative narcotics results in fewer disturbances of peristalsis. In the present series there was only one case of distention where the use of the Levine tube was necessary; generally, patients were greatly benefited by decreased gas pains. As stated before, complete amnesia for the day of the operation was obtained in all cases, a feature greatly appreciated by the patients, especially those who had undergone previous operations.

The only shortcoming of sigmodal basal anesthesia is a moderate degree of postoperative excitement and restlessness which occurs in about 5 per cent of the patients. This amount of restlessness is to be expected but is low in comparison to that following other barbiturates; according to Tritsch and Brown⁴, barbiturates are mid-brain sedatives and act as excitants in 25 per cent of the cases. However, 1/3 grain of pantopon or 1/32 grain of dilaudid hypodermically suffices to overcome the restlessness within 10 to 20 minutes and to restore peaceful and sound sleep.

The following statistics give detailed information regarding the present series: Table I shows the distribution of ages; Table II, the classification of the material in minor and major operative procedures. Of 63 minor operations, 42 were performed under sigmodal sleep exclusively, while 21 required an additional anesthetic. In 62 major operations, general anesthesia was additionally used in 47 cases, while 13 patients were operated on in local anesthesia; spinal anesthesia was used in two instances. Table III provides classification of minor operations; the 21 cases with additional anesthesia comprise 15 with inhalant and 6 with local anesthesia. The inhalant anesthesia was ether in 10 cases, vinethene in 4 instances and ethylene in 1 instance; the amount did not exceed 1 ounce of ether or 1/2 ounce of vinethene. As shown in Table IV, the major operations consist of 48 laparotomies, 6 vaginal hysterectomies, 2 excisions of the vulva, 1 gland dissection, 2 radical breast operations, and 3 thyroidectomies. Table V gives the type and the amount of additional inhalant anesthetic needed in the major operations. The additional amount of ethylene in these cases was 5 gallons per hour; this represents a saving of 75 per cent. Six cases (under local anesthesia) did not require any additional anesthetic, while in the remaining 46 cases ether was used.

TABLE I. Distribution of Ages

Age:	10-20	21-30	31-40	41-50	51-60	61-70	71-80	Total
Patients	3	18	29	36	22	14	3	125

TABLE II.

Minor Operations—		
Without additional anesthetic	.....	42
With additional anesthetic	.....	21
Major Operations—		
With general anesthesia	.....	47
With local anesthesia	.....	13
With spinal anesthesia	.....	2
Total		125

TABLE III. Minor Operations

OPERATIONS	Without Additional Anesthetic	With Additional Anesthetic	Total
D & C plus Radium implant.	35	7 Ether; 4 Vinethene	11
D & C plus Sturmorf operat.	2	1 Ether	1
D & C diagnostic	4	1 Ether; 1 Ethylene	2
Colpoperineorrhaphy		5 Local; 1 Ether	6
Vesical fistula operation		1 Local	1
Ca urethrae; Radium implant.	1		
Totals		42	21

TABLE IV. Major Operations

Laparotomies—		
Hysterectomies	.....	18
Adnexal operations	.....	13
Appendectomies	.....	11
Ectopic pregnancies	.....	3
Cholecystectomies	.....	2
Postoperative abdominal hernia	.....	1
Other Major Operations—		
Vaginal hysterectomies	.....	6
Excision of vulva	.....	2
Gland dissection	.....	1
Radical breast operations	.....	2
Thyroidectomies	.....	3
Total		62

TABLE V.

Amount of Additional Anesthetic in Major Operations

	Total Cases	
Ethylene—10 cases; gas flowing 5 gallons per hour	10	
Ether—		
None	6	
Under 50 cc.	9	
Under 100 cc.	16	
Under 150 cc.	8	
Under 200 cc.	4	
Under 250 cc.	5	
Over 250 cc.	4	
	52	
Total		62

The saving of inhalant anesthetic is considerable and runs from 50 to 75 per cent. It is indeed impressive to do an appendectomy with less than 2 ounces of ether, or to perform a hysterectomy or a cholecystectomy with less than 3 ounces; one of the radical breast operations required only 80 cc. of ether. It is interesting to note that the four cases which required more than 250 cc. of ether were emergency appendectomies where circumstances forbade the giving of a cleansing enema; obviously, the sigmodal solution was partly absorbed by fecal masses in the rectum. One feels that the small amount of inhalant anesthetic prevents irritation of the bronchi and toxic degenerative processes in the liver and thus adds substantially to a quick and uneventful recovery.

In thyroidectomy, where patients normally are in a nervous and irritable condition, the dose of sigmodal should be increased, even up to 10 cc.; surgery can then be easily performed under local anesthesia.

SUMMARY AND CONCLUSIONS

Experiences with the new barbiturate, sigmodal, as a basal anesthetic have been reported and the results in 125 operative cases, 62 of them major operations, have been recorded. There was no major incident or accident before, during, or after operation chargeable to the new anesthetic.

1. The use of sigmodal as a basal anesthetic is a safe procedure and does not increase but actually decreases the operative risk.
2. Its administration is simple and may be entrusted to internes or reliable nurses.
3. It provides easier and smoother narcosis.
4. Its use results in considerable saving of inhalant anesthetics and facilitates local anesthesia.
5. It decreases the danger of postoperative lung complications.
6. It eliminates the psychic trauma and dispels the patient's general fear of the operation.

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HAPPY NEW YEAR

We have completed another year in our life's cycle. Why it has become the custom to celebrate New Year's Eve with reckless abandon, we cannot understand. Why should anyone resort to hilarious means of escapement from the realities of life on so sacred a moment?

Each season has its characteristic meaning. New Year's Eve should signify a time when we balance our books, meditate upon the achievements of the past, and courageously lay our plans for the future. Seriousness and sobriety are not incompatible with a happy frame of mind.

We are happy to have lived through the old year. We are happy that so many of our friends have survived. We cherish the memory of those who are gone and appreciate the friendship of others whom we have learned to know. Therefore, to all our friends—both old and new—we sincerely wish a most Happy New Year.

A. E. H.

MINNESOTA'S PNEUMONIA PROGRAM

No single feature of Social Security legislation has had such immediately beneficial medical effects in a variety of ways as has that title under which the Pneumonia Service of the Minnesota Department of Health was developed. Undoubtedly, the multiplicity of the benefits is due to the manner in which the service has been organized by Dr. Chesley, Dr. McDaniel, and

others of the personnel of the Division of Preventable Diseases of the Minnesota Department of Health.

In operation, the plan requires that sputum be collected as early as possible. Sputum containers are provided, or, for infants, pharyngeal swabs implanted in diphtheria culture agar slants convey material for typing of the organisms. Either container is mailed or sent by bus to the Pneumonia Service on the University Campus or to the district offices in Duluth, Bemidji or Mankato. Twenty-four hour typing and serum service is maintained in all of these laboratories. Should the Neufeld method not be positive, a mouse is injected for bacterial typing. By either one method or the other, accurate determination of the causative organism is assured within a twelve-hour period. Type-specific serum is sent immediately by bus or train to the attending physician.

In this manner, the correct serum is in the hands of the family doctor within twenty-four hours from the time he has first seen the patient. Serum is provided in all cases to which it can be administered within four days of the first symptoms. Serum of all types up to type IX is available at the laboratories. Since serum for all types is now made, airmail service to New York for some of the rarer types of serum has been resorted to in some instances by the Pneumonia Service. Wholesale prices are charged for the serum when the patient can pay. However, whether the patient can pay for the serum or not, the serum is provided. Patients are requested to pay any portion of the serum cost which they can afford. Through this service the latest and most

specific treatment of pneumonia is within the reach of every person in Minnesota. All that is necessary is that a physician to be called within two or three days of the earliest symptoms.

According to Finland, the mortality in 148 cases of type II pneumonia treated without serum was 51 per cent. Other investigators have found the mortality in cases not treated by serum to vary from 14 to 45 per cent. Reduction in the mortality rates for various types of pneumonias by serum treatment has varied from 30 to 77 per cent. Statistics presented by the Minnesota Department of Health and other critical investigators indicate that a reduction of 50 per cent in the mortality of pneumonia in general is possible by adequate serum treatment. On the basis of data compiled over a five-year period prior to 1936, Chesley, McDaniel and Heathman estimate the annual number of cases of pneumonia in Minnesota at 3,334, and during the same years they show the average annual number of deaths to be approximately 2,000. From these data, it is apparent that full utilization of this plan potentially can save 1,000 lives in Minnesota per year.

The actual saving of life is not the only benefit. Such treatment can be and often is given in the home, thus sparing the patient the cost of hospitalization. Expensive drugs other than serum are not necessary so the drug bill is kept at a minimum. Also important in the reduc-

tion of cost of medical care are the shorter course the disease runs following serum and the decreased incidence of complications. These two factors reduce both the length of stay of a trained nurse when one is necessary and also the amount of actual medical attendance in cases of pneumonia treated with serum. And not of least importance to the medical profession is the proper integration of the practicing physician in his rôle of case-finder and active therapist.

Only one question will determine the continuance or growth of this program. Are state and Federal funds ample to provide the services and serum which are necessary? With a growing demand that the medical profession assist in the reduction of cost to the patient of adequate medical care, every member of the profession in Minnesota should assist in any way possible any legislation necessary to keep appropriations for such a program at the level required for its successful operation. And if the politicians and anti-medical propagandists are as altruistic and humanitarian as their expressions portray them, there should be no difficulty in securing the appropriation of funds which provide such a service.

Dr. Chesley, Dr. McDaniel and the personnel of the Minnesota Department of Health are deserving of the undying gratitude of the physicians and people of Minnesota for the institution of a pneumonia program that should prove a model for all other states.

S. J. E.

Book Reviews

Your Chest Should Be Flat, by S. A. WEISMAN, M.D., F.A.C.P.; 145 pages, 17 tables and 74 illustrations in 49 figures; Philadelphia: J. B. Lippincott Co. Price, \$2.00.

The author of popular medicine is confronted with two pitfalls. On the one hand, there is the temptation to sacrifice accuracy for palatability. On the other hand, he may state his scientific case in a dull and uninteresting style. Dr. WEISMAN in *Your Chest Should Be Flat* presents considerable original experimental evidence in a simple, readable, precise style. With a single pelvimeter, the author measured over 20,000 chests and arrived at some important conclusions:

(1) The flat chest, not the round one, is the normal chest. (2) Round chests are more frequently associated with tuberculosis than flat chests. (3) Round chests are not hereditary, but are rather the result of poor socio-economic background. (4) Children with round chests are on the average lighter and shorter than those with flat chests, are lower in their school work and are more liable to positive tuberculosis tests.

Because the deep chest of the infant tends to flatten out with growth, Dr. WEISMAN suggests that this normal development is of vital importance in the prevention of tuberculosis, especially during adolescence. The objective of his book is to present the average flat chest as normal configuration. He wishes to stress this point not only to physicians but also to parents, teachers, social workers and all those engaged in the training of children and young people, especially public health officers and physical educators. Dr. WEISMAN's objective is well illustrated by the remark of a physical educator, who selected athletic runners by the shape of their chests. The flat, wide-chested youth has more endurance and better wind than the deep, round-chested boy.

The author is to be commended for his sincere interest in the social aspect of tuberculosis.

Diseases of the Skin, by GEORGE CLINTON ANDREWS, M.D.; 2nd edition, brown cloth, gold stamped, 938 illustrations, 850 pages, plus index; Philadelphia: W. B. Saunders & Company; 1938. Price \$10.00.

The author of this text is to be congratulated on the clear, concise manner in which he presents the subject of dermatology. The book, which is quite complete, includes the most recent developments on allergic dermatoses and the methods for testing. The pictures and diagrams are extremely clear-cut and definite. Therapy is described, including X-ray therapy. This is a book valuable to the medical student, general practitioner and specialist.

A Textbook of Medicine by American Authors, edited by RUSSELL L. CECIL, A.B., M.D., Sc.D., and FOSTER KENNEDY, M.D., F.R.S.E.; 4th edition, revised and entirely reset, blue heavy cloth, stamped in black & gold, 1,545 pages, 42 figures, no illustrations, bibliographies at end of sections; Philadelphia: The W. B. Saunders Company; 1938. Price, \$9.00.

The accomplishment of this 4th edition of a famous American text on medicine must have cost Professor CECIL a great deal of personal anguish, for in adding so many new contributors to the work, he must have cast off others for whom he had come to entertain much affection and respect. But it is ever thus in the ceaseless campaign to keep such a work up-to-date. New blood must be infused. Older authorities must give way to the younger and more active men. As it now stands, this book is a very fine treatise on general medicine, and merits the consideration of everyone from medical tyro to established specialist. It is just such a book as this that the specialists in other fields sought to depend upon as a "refresher" in medicine. It is a book which THE JOURNAL-LANCET confidently believes will do good for every practitioner.

Societies

SCIENTIFIC PROGRAM OF THE MINNEAPOLIS CLINICAL CLUB

Meeting of October 13, 1938.
E. S. Platou, M.D., Presiding

Abstract of Inaugural Thesis:

INFANTILE CEREBRAL PALSY*

JOHN F. POHL, M.D.

MINNEAPOLIS, MINNESOTA

The paper was concerned mainly with the diagnosis of cerebral palsy. As a groundwork for discussing the possible types of motor disorder, the anatomy of the nervous system controlling motion was presented. The term spastic paralysis is not good because many of these children do not have either spasticity or paralysis. Two main types of motor disorder are recognized in the child, the true spastic suffering from damage to the pyramidal system and the athetoid type suffering from damage to the extrapyramidal portion of the nervous system. This differentiation is highly important because treatment in the two types is entirely different. The true spastic depends upon repetitive muscle training and surgery for relief. On the other hand, the athetoid type suffers from supervening uncontrolled motions rather than from actual paralysis and can only be improved by first acquiring relaxation. Muscle training and surgery are of little value in the patient with the athetoid disorder and, in fact, may do more harm than good. Contrary to general opinion, many children with severe motor disorders have normal mentality.

DISCUSSION

Dr. E. D. ANDERSON: I should like to discuss this question from the standpoint of the men who first deal with these children and their families.

In the first place, the present day conception of congenital cerebral palsy is that it is a condition which may occur before birth, at birth or after birth. When I was in school and for several years afterward, I thought it was caused only by birth injury and I am sure that the great bulk of the public still consider this to be so. I think that the general practitioner or the pediatrician who cares for such a child has a real responsibility to the obstetrician in making it clear that this is not necessarily and usually not so. By doing this, we may prevent the parents from unjustly criticizing the obstetrician for a condition for which he is not at all to blame. The trouble may have occurred many months or weeks before the child was born or it may have occurred afterward. It seems to me that it is our duty to educate the public to the true cause and that we should go out of our way to do so in order that the man who delivered the case be not unjustly criticised.

The second point I would briefly like to mention, which to me is most interesting, is that we sometimes find these children without spasticity. Up until a few years ago, I always had the conception that a cerebral palsy had to have marked spasticity but we see these cases with marked flaccidity and they are cerebral palsies just the same. We do not have to have a spastic child to have a cerebral palsy.

The pediatrician must assume his share in carrying part of the load in the care of these children even though the treatment has been turned over to the orthopedist. I think the tendency is often to hate to see such a child come to us because we know how often it means great tragedy for both the child and the family. It would be easy for us to make the diagnosis, turn the case over to the orthopedist and let it go at that but if we do so we are neglecting our job. Our responsibility is first, to help the family in the care of the child and second to help them to face facts.

* Complete paper to be presented in a later issue of THE JOURNAL-LANCET.

As I go along through life practicing medicine, I am convinced that nothing is gained by not facing facts and I think this is particularly true for those parents who have tragedy before them for years to come. We must not shirk our responsibility and even when we have shown them the situation clearly our work is not yet complete. We must help them to adjust themselves to their problem. First we must help them to find the best possible place for the child. If he has the mentality to do things, where is the best place for him to get his training? I find the tendency of these parents is to be ashamed. They must be convinced that although they have a tragedy they have no cause for shame. Then, we find so often that the mother particularly has a tendency to draw up in a shell, to dislike going out, even to church; that she becomes too attached to the child and tries to smother it with attention. I have seen more than one family ruined because the mother has not seen that the kindest thing she could do for the child, her husband and the other members of the family was to simply lead a normal life.

I repeat that such a family is a sick family and it is our responsibility, first, to diagnose and treat the patient; then to help the family to face this problem and adjust themselves to it.

Dr. H. B. HANNAH: I think Dr. Pohl should be congratulated on the method used in the preparation of this paper. He calls our attention to some very fundamental principles in neurology and differentiates an upper from a lower motor neuron lesion. He also differentiates the upper neuron lesion from lesions in the cerebellum. It seems to me that many times infantile cerebral palsy whether it has occurred before delivery, at the time of delivery, or after delivery, is thrown together in one basket without any effort being made to differentiate or to determine the exact location of the lesion. He has pointed out the clinical findings between a pyramidal tract lesion and an extrapyramidal tract involvement. We should certainly always attempt to determine the location of the lesion and we should think of the lesion in the pyramidal tract like an ordinary stroke of apoplexy, and those outside of the pyramidal tract in the basal ganglion as like the syndrome in Parkinson's Disease with the involuntary movements and the so-called poker type of rigidity rather than spasticity. In the poker type of rigidity, there is no real spasticity but the muscles move in jerks. If you examine the eyeballs carefully in the extrapyramidal type of lesion, you see the same cogwheel type of movement of the eyes.

I had occasion recently to see a case that showed a condition of involvement of some of the motor nuclei in the pons and also extensive involvement of the pyramidal tracts. In my experience, this particular combination of lesions in infantile cerebral palsy is quite rare. Recently, a doctor in St. Paul had a case where the lesion was in the hypothalamus, where the child, off and on, would have attacks of extreme drowsiness with high temperature. This was apparently one of the cases that had occurred after delivery, where a non-suppurative type of encephalitis had attacked the child early in life.

Again I want to congratulate Dr. Pohl in his careful analysis of infantile cerebral palsy from the standpoint of anatomy and physiology.

I might say that many of these children with infantile cerebral palsy are brought in by the Probate Court of various counties throughout the country for examination as to their intellectual capacity. We have seen a large group in Hennepin County. One of the most difficult problems is how to determine whether these children are defective intellectually and to what degree are they defective. In other words, what method of examination can be used. Many of them cannot talk plainly, they have not had much advantage as far as educational facilities are concerned, and in addition to their difficulty in speech, they also have difficulty in locomotion and in writing. They are brought in on a feeble-minded petition and many of them unable to talk are, therefore, unable to protect themselves and are often committed to the state institution because of their general appearance. This always seems to me to be really a crime, because they are so often unable to express themselves and unable to let one know what fundamental intellectual capacity they may have. They are put into an institution with definitely defective children and this must be a tremendous emotional strain on them as time goes on. We, as doctors, should

all be very careful to make every effort to determine as clearly as possible the I. Q. of the child before putting it into some public institution for the feeble-minded.

Dr. M. O. HENRY: The most important thing in the treatment of spastic paralysis is the determination of the child's intelligence quotient. If his I. Q. is normal, or above, then a child is suitable for re-education, both mental and locomotor.

I am pleased to hear Dr. Anderson suggest that these children generally do better away from home. I have just had a chance to see some of the results of the Charmane School for spastics at Birmingham, Alabama, and the results of that school certainly indicate that these children do better away from home. The workers in this school strive to improve the child's speech, and, curiously, as the speech improves the control of the motor apparatus improves. Unless we can reach these cases mentally, there is no use correcting physical deformities.

As to the proper age for testing mentality, perhaps this is at two and one-half to three years, for at that age the child can understand the workers. Often under that age they cannot understand, and the I. Q. test is of no value to the orthopedic surgeon.

Dr. E. T. EVANS: I recall a case treated by repeated lumbar punctures within the first few days in which the baby lived, but irreparable damage had already occurred.

One of the things we must never forget in instructions to the parents as to what they are to do about this child, is that they can rehabilitate their own homes with more normal children. The relation of that child to the other children should also be considered. I think lay people, as you know, are not very kind and they are going to turn around and talk about this child as a mental deficient so frequently that there is difficulty in the handling of the normal child in the home. I think the normal child in the home has as much right to be protected as the spastic.

Dr. Anderson is correct in that these children should be away from the home influence while under treatment in order to rehabilitate them without scrapping the normal child.

Nothing has been said as to the details of treatment of these children. I do not quite agree with Dr. Henry. I do know that a child can be taught to walk even though walking with a shuffle, and I am certain that that child will enjoy life more than he would as a "scissors gait" child even though mentally he may be a "little foolish."

I would like to ask how many cases of adult palsy there are?

Dr. R. T. LAVAKE: Obstetricians have the prevention of this condition before their minds in every labor. To this end, a type of delivery is chosen which is easiest for the child in point of trauma, and yet does not increase the dangers of morbidity and mortality for the mother. Even with the safest type of delivery from the standpoint of the child, namely cesarean section, one cannot be sure of preventing cerebral hemorrhage with chance of brain injury.

I have had one case of fetal death following cesarean section in which the autopsy revealed a cerebral hemorrhage. There are many other such cases on record. By the same token, I have had many fetal deaths following ideally easy and normal deliveries, when autopsy showed cerebral hemorrhage. These hemorrhages were likely due to blood vessel defects or blood dyscrasias. Speaking of blood vessel defects, just lately I had an infant die three days after an easy, normal vertex delivery. Autopsy revealed a hemorrhage, originating in the right suprarenal gland, which had broken through the capsule, surrounded the right kidney and finally broken into the peritoneal cavity. No amount of care will prevent such hemorrhages; and when they occur in the cranial cavity, the possibilities are obvious.

Strange to say, the only cases of Little's disease that I have had in my practice followed easy normal delivery. Some cases, I feel positive, are due to congenital defects. We were speaking of a specific instance at supper. It was an easy twin delivery. The first child died after a few minutes. It was markedly hydrocephalic and had a heart lesion. The second twin, who looked just like the first twin, lived but has Little's disease. In this instance, to my mind, it was a congenital condition, and not due to birth injury.

Without trying to dodge our responsibilities as obstetricians, I believe with Dr. Anderson that in all justice, patients should

be advised of the impossibility of preventing this condition at times.

Dr. E. S. PLATOU: Are there any figures as to what percentage of these cases are pyramidal and extrapyramidal? I wish you would say a few words about the value of the Magnus reaction, also how early the exact diagnosis is at all practical and how early treatment can be effectively instituted.

The diagnosis of this condition from other lesions of the nervous system should be mentioned. It is important to think of the possibility of other lesions and not assume immediately that we are dealing with cerebral palsy simply because a child is having spastic symptoms.

The psychological handling of cerebral palsy is an extremely important part in the treatment not only so far as the family is concerned but also for the child. Too often we turn these children over to a "curative shop" or to an orthopedist and do not do our share toward getting the family to carry out every angle of the treatment.

Dr. R. L. WILDER: One thing brought out by Dr. Evans that should be mentioned, is that babies may have cerebral hemorrhage and not develop any abnormalities. I had occasion about a month ago to see a child I took care of ten years ago. She had a large cerebral hemorrhage in the first few days after birth. The same management mentioned by Dr. Evans—repeated spinal punctures—was carried out over a period of a week or ten days. The baby seemed to get along all right and is entirely normal now at ten years of age. One certainly is justified in treating and trying to cure those babies who have cerebral hemorrhage.

Dr. JOHN F. POHL: I am very grateful for the way in which the members have received my efforts. Frankly, my ideas are mainly those of Dr. Bronson Crothers, neurologist to the Children's Hospital in Boston, with whom it was my great privilege to work for a time. I think the work he has done should be regarded with the utmost respect. Anyone who knows him appreciates the honest conviction with which he speaks.

It must be recognized that the child with cerebral palsy is an important problem. In recent surveys by the Crippled Children's Division of our State Board of Control, the children with cerebral palsy were found to be about as numerous as those from any other single cause. The important thing for most of these people is to determine intelligence as early as possible. This requires a high degree of training on the part of the person who does the testing. It is possible to grade intelligence at a very early age. An important procedure which we have neglected is the encephalogram. If we can demonstrate actual brain deficit in these children, we are in a stronger position to discourage training and wasted time and effort on those children who will never amount to anything.

Complete institutionalization is not the answer to the problem. These children need a home and the care of the mother as much as any child. The inability of the child to communicate with others is no reason for discarding him. I will admit that it is best to get the child away from home part of the time as early in life as possible. The bad thing about the home is that the child learns early to become dependent. The more that is done for the child the less it will do for itself.

Our Dowling School appears to be the best solution at the present time. Here the children compete against each other. They take the greatest delight in doing something better than another child. The competition is on a plane where they can compete. They get a good deal of stimulation out of it and that is for what we are working. Passive treatment is worthless. The child must be trained to do things for itself. We are inclined to start training much earlier than previously. A child even a year or a year and a half old can be taught to move large joints if one is patient.

The point Dr. Anderson made about the cause of cerebral palsy is one which still causes much discussion. Certainly a lot of dead newborn infants have hemorrhage of the brain when autopsied. Whether this is of importance or only incidental is not entirely clear. It must be kept in mind that gross hemorrhage over the brain is not the only kind of bleeding. Often there are multiple petechial hemorrhages scattered through the brain tissue, which indicates brain damage. The men at Johns Hopkins University are doing excellent work. I believe they

feel that congenital maldevelopment is the important cause of this condition. So far, I think, the majority opinion is that trauma at the time of birth is the most important factor.

Dr. LaVake made an important observation. An easy delivery is no guarantee of a normal baby. I believe the child *in utero* is under greater pressure than atmospheric. In doing Caesarian section, we find that the child is apt to be a little premature. He is delivered from the uterus quickly and there is a rather precipitous drop to outside pressure. This change in pressure relationship has been stated to be the cause of rupture of blood vessels and resulting cerebral hemorrhage in this type of delivery. I think it must also be recognized that the forces of normal labor are terrific and can damage a baby entirely independently of anything the obstetrician does.

In hydrocephalus due to gradually increasing intracranial pressure, mentioned by Dr. Dwan, we are dealing with a little different problem than the hydrocephalus due to shrinkage of the brain. The sutures and fontanelles can compensate for a good deal of pressure and marked reduction of tissue of the brain may occur with very little resulting evidence either in reduced mentality or motor function.

Dr. Platou mentioned the tonic neck reflexes of Magnus. These are primitive responses and indicate an extreme degree of brain damage, approaching the decerebrate animal. The test is of value in the very young child and when present indicates a very bad prognosis.

In closing, I wish to again thank the members for their fine discussion of this problem and for the many helpful remarks.

CASE REPORT

PAUL DWAN, M.D.

MINNEAPOLIS, MINNESOTA

I would like to introduce a case report relative to this subject. This case was at first thought to be an ordinary cerebral palsy but subsequent developments revealed its unusual nature. The existence of such cases makes it necessary for us to study the pathology of such conditions whenever possible.

The mother is para-1; labor was difficult; toxemia at the time; no instruments used. Examination revealed a well developed well nourished male infant, lying flat on his back, uttering shrill cries when disturbed; face puffy, eyelids swollen; pupils pinpoint, no light reflex; features set in a scowl; extremities held flexed, rigid, twitching in spasmodic jerks; reflexes hyperactive; refused to nurse. Impression: birth injury with spasticity; possible tetany of newborn. Fed by gavage, milk formula; given calcium in massive doses; given parathormone.

He eventually began to nurse and did well nutritionally. He remained spastic and eyes remained the same. At 4 months it was suspected that he was blind; pupils were still pinpoint and he showed no evidence of sight. Pupils were dilated by atropin and consultation revealed pale white nerve heads and a diagnosis was made of primary optic atrophy.

An encephalogram revealed cerebral atrophy with symmetrically dilated lateral ventricles. During the procedure, in fact after the first 5 cc. of air was introduced, the spinal fluid took on a uniform pink cast which persisted throughout the next 15 cc. of fluid. It was thought that some adhesions might have been broken by the bubble of air. Following the encephalogram, the baby's condition seemed to improve, the pupils dilated and reacted to light. Examination of the eyegrounds showed a marked change with the color of the nerve heads changing to pink.

During all his life his temperature was unstable; it would sometimes rise to 104° without explanation. At 6 months he vomited dark brown material that gave a positive benzidine test for blood; it was thought he might have swallowed some blood incidental to teething. The next 5 months his condition remained about the same but, suddenly on February 7, 1938, he became limp, pale, and died.

The body is that of a well developed, well nourished white male infant, 66 cm. crown—heel and weighing about 20 lbs. There is beginning rigor and hypostasis posteriorly; no edema, cyanosis or jaundice. The pupils are 3 mm. in diameter and regular. There are no marks on the body. The peritoneal cavity contains a few cubic centimeters of fluid; there are no adhesions and the surfaces are normal. The appendix is free and

normal. The diaphragm arches to the fourth rib on each side. The edge of the liver is down 3 cm. in the midline. The pleural cavities are negative; no fluid, no adhesions. There is about 5 cc. of clear fluid in the pericardial sac; no evidence of disease. The heart weighs 30 grams. The foramen ovale is closed. The valves and myocardium appear normal. The root of the aorta and the coronaries are negative. Each lung weighs 100 grams; no pus can be expressed but areas in both lungs are suggestive of early bronchopneumonia. The spleen weighs 10 grams and appears normal. The liver weighs 300 grams. The surface is cloudy. The cut surface is yellow, suggesting fat. There is about 15 cc. of clear brown bile in the gallbladder; the walls appear normal. The gastro-intestinal tract, pancreas and adrenals are normal. Each kidney weighs 25 grams. The surfaces appear cloudy. The parenchyma appears normal. Both kidneys show fetal lobulations. The ureters are normal. The bladder contains a small amount of clear urine; the walls are normal. The testes are in the scrotum and appear normal. The aorta is smooth. The thyroid and parathyroids are normal. The lymph nodes are not enlarged, except the mesenterics.

Upon removing the calvarium, we find there seems to be some excess of subarachnoid fluid; there is a space of about 1 inch between the cortex and the skull. The brain is markedly atrophied. On section areas in the white matter of the cerebrum and pons feel hard, like sponge rubber, suggesting diffuse gliosis. Several small cavities in the white matter in these areas may be postmortem changes. The ventricles are markedly dilated but no block is found.

Examination by Dr. A. B. Baker: The brain is markedly shrunken, 10 cm. in its widest portion and 7 cm. in depth; it is impossible to measure the length of the brain (it had already been sectioned). Coronal sections reveal extensive hydrocephalus of all the ventricles, not the result of any obstructive process, but due primarily to shrinking or decrease in the cerebral white substance. The cortex of the brain is normal in appearance and measures in places almost 5 mm. in thickness. All the white substance is reduced and in some regions is represented by only a thin core of material. In the occipital pole the white substance measures 1 mm. in thickness while along the lateral ventricles it measures 2 mm.; the white substance is firm and rubbery to palpation. Within both basal nuclei is a cavity measuring 8 x 10 mm.; it is multilocular and is situated in the center of the basal nuclei, involving portions of the thalamus, putamen and globus pallidus. The cerebellum and the temporal lobes of the brain are relatively uninvolved. The base of the pons, medulla and midbrain are very firm and pale. The involvement extends from the pons along the brachium pontis into the cerebellum where there is involvement of the medullary core up to the dentate nucleus; no other involvement is seen within the cerebellum. All the cerebral substance appears pale but the cerebral architecture, aside from atrophy of the white substance, seems unimpaired.

Microscopic Examination. Extensive demyelination involves all areas of the white substance; scattered through these areas is an extensive but patchy gliosis; in some areas the glial proliferation has resulted in the deposition of heavy bands of glial fibers. In the brachium pontis there is almost complete replacement by glial fibers of the entire structure, having a fibrous homogenous appearance. Astrocytic proliferation is quite common. There is a tremendous increase of astrocytes along the ventricles, forming a characteristic subependymal gliosis. Numerous glial nodules are found scattered throughout the involved areas of the brain. Within the basal structures large cavities can be observed, surrounded by glial walls; portions of the cavitations are still undergoing destruction and are filled with numerous fat granule cells containing cerebral debris. The adjacent tissue is filled with proliferating astrocytes, many of which have formed gemastocytic cells and giant astrocytes. Within the pons these pathologic astrocytes have already become filled with calcium deposits. The cortical cells are shrunken and somewhat pyknotic but it cannot be determined whether this is a true antemortem change.

The appearance is that of diffuse demyelination with secondary gliosis, quite characteristic in Schilder's disease of the

adult. Since it has occurred in a child it is termed infantile Schilder's. The condition was described by Pelizelus and Merzbacher and in the literature is known under their names. It is really a type of infantile diffuse sclerosis of the brain.

(A. B. B.)

Diagnosis: Infantile Schilder's disease (Pelizelus-Merzbacher's disease).

L. R. BOIES, M.D.,
Secretary.

Minnesota State Board of Medical Examiners

Julian F. DuBois, M.D., Secretary
St. Paul, Minnesota

DOCKET OF CASES

Minneapolis Woman Found Not Guilty of Obtaining Morphine From Physicians by Fraud and Deceit

Re: STATE OF MINNESOTA *vs.* HELEN GENEVIEVE RUDD

After deliberating more than 19 hours, a jury in the court of the Honorable Mathias Baldwin, Judge of the District Court, Minneapolis, found Helen Genevieve Rudd not guilty of obtaining morphine by fraud, deceit and misrepresentation under the new 1937 Minnesota Uniform Narcotic Drug Act.

The defendant was arrested July 7, 1938, following a joint investigation of the matter by the Federal Bureau of Narcotics and the State Board of Medical Examiners. The defendant has been in the Hennepin county jail since that time in default of bail. About a week before her trial began, she entered a plea of guilty to the charge before Judge Day but upon being questioned by the Court prior to being sentenced stated she was unable to state the circumstances surrounding the obtaining of the two prescriptions that were the basis of the charge. Thereupon the Court ordered the plea of guilty stricken and the case set for trial.

The case was well tried for the state by Mr. Arthur Markve, assistant county attorney. The evidence offered by the State showed that the defendant had been attended by six Minneapolis physicians from the middle of April, 1938, and June 30, 1938, a period of six weeks. She was complaining of pain that indicated to each of the physicians called that she had a kidney stone. From five of these physicians she received morphine either in the form of hypos or by prescription. She received 12 prescriptions for morphine from four different physicians in 13 days, May 6 to May 19, also one on June 30, a total of 78- $\frac{1}{4}$ grains. One physician testified that he wrote a prescription on May 6 and another on May 7 after the defendant had stated to him that she had lost the first one. This was denied by the defendant; she admitted getting the prescription but denied she had lost the first one.

The defendant was convicted in Federal court in Minneapolis in December, 1934, on a charge of forging and altering narcotic prescriptions. She served 14 months in the Federal Industrial Institution for Women, at Alderson, West Virginia, on that charge. She is married and lives with her husband and one daughter. At the time of her arrest this year her address was 2527 First Avenue South, Minneapolis. She is 39 years of age, about 5 feet 2 inches in height, and weighs about 155 pounds. She appears to be older than the age stated.

The State Board of Medical Examiners urges every physician to refrain from administering, furnishing or prescribing morphine for this woman. If a call is made for a physician, he should insist on a complete examination, including X-ray, and hospitalization, if necessary, before any narcotic is given.

Minnesota License of New York Physician Revoked *In the Matter of the Revocation of the License of*

NORMAN W. FOSTER, M.D.

The Minnesota State Board of Medical Examiners on November 4, 1938, revoked the license to practice medicine and surgery held by Norman W. Foster, M.D., of Syracuse, New York. The evidence before the Board showed that Dr. Foster was convicted in the District Court of the United States for the Northern District of New York on the 19th day of October, 1937, of violating the Harrison Narcotic Law.

The indictment against Dr. Foster charged him with having sold, bartered, exchanged and given away 13,120 $\frac{1}{2}$ -grain morphine sulphate tablets and 840 $\frac{1}{3}$ -grain pantopon tablets to FOUR patients during a period of five months.

Dr. Foster was born in New York in 1874 and graduated from Syracuse University College of Medicine in 1898. He was licensed in Minnesota by examination in 1898. He resided in St. Paul before returning to New York. His New York license was revoked in March, 1938.

Hopkins Physician's License Revoked

In the Matter of the Revocation of the License of

GEORGE W. MOORE, M.D.

The license to practice medicine and surgery held by George W. Moore, M.D., Hopkins, Minnesota, was revoked by the Minnesota State Board of Medical Examiners on November 4, 1938. Dr. Moore was found guilty by the Board of "immoral, dishonorable and unprofessional conduct," and specifically with "procuring, aiding and abetting a criminal abortion."

Dr. Moore was before the Medical Board in 1936 on a similar charge and after being reprimanded was placed on probation. The facts show, however, that Dr. Moore continued in this type of criminal practice. Dr. Moore offered no defense at the hearing except to state that he did not "care to discuss the matter."

Dr. Moore was born in Indiana in 1870 and graduated in Medicine from the University of Minnesota in 1892.

License of Minneapolis Physician Suspended for Three Years

In the Matter of the Revocation of the License of

SAMUEL R. FRAKER, M.D.

The Minnesota State Board of Medical Examiners, at its regular meeting held on November 4, 1938, suspended, for three years, the license to practice medicine and surgery held by Samuel R. Fraker, M.D., Minneapolis. Dr. Fraker admitted his guilt before the Board of a charge of "procuring, aiding and abetting a criminal abortion." Dr. Fraker in his plea that his license be not revoked stated to the Board that he was retiring from the practice of medicine because of ill health.

Dr. Fraker was born in Pennsylvania in 1870 and graduated from the College of Physicians and Surgeons, Baltimore, in 1904.

License of Red Wing Masseur Suspended

In the Matter of the Revocation of the License of

CHRIS J. BOHMBACH, Masseur

Following a hearing held on November 4, 1938, the Minnesota State Board of Medical Examiners suspended for a period of thirty days, the massage license held by Chris J. Bohmbach, Red Wing, Minnesota.

Mr. Bohmbach was charged with having held himself out to the public as a Doctor, Chiropractor and other designations whereas the laws of the state limit him to the term Masseur. He was also charged with practicing chiropractic without being licensed.

At the hearing Bohmbach stated to the Board that he had removed from his office all signs, diplomas and other placards referring to him as a Doctor or Chiropractor. Bohmbach had twice previously been warned to remove these signs.

Evidence was also presented that Bohmbach's practice constituted the practice of chiropractic and not massage. He has been warned to keep within the provisions of the massage law or else further action will have to be taken.

News Items

Dr. J. L. Richards, Polson, Montana, was re-appointed county physician and secretary of the board of health for 1939 by the Lake county board of commissioners.

Dr. G. H. Hilts of Bowbells, North Dakota, has been appointed county health officer for Burke county.

Dr. O. W. Anderson, Fort Peck, Montana, has moved to Luverne, Minnesota where he is opening an office.

Dr. A. Einer Johnson was elected president of the Watertown, South Dakota, district medical society at the annual meeting held Dec. 13, 1938. He succeeds Dr. O. S. Randall.

The Council on Medical Education and Hospitals of the American Medical Association has approved of Trinity Hospital, Minot, North Dakota, for residencies in general surgery and medicine. The institution has been on the approved list for interns for several years.

Dr. Gunder Christianson is opening an office in Sharon, North Dakota. A graduate of Rush Medical College, Dr. Christianson spent the last year in Bismarck with the Roan and Strauss clinic.

Dr. V. S. Irvine, formerly of Park River, North Dakota, has moved to Grafton, where he is now practicing.

Dr. H. W. Arndt of Detroit Lakes, Minnesota, has been elected president of a newly organized hospital staff at the St. James hospital in Perham.

Dr. A. H. Reisinger, Wahpeton, North Dakota, was named president of the Richland County Medical association at the annual business meeting held recently.

Dr. O. E. Snyder has opened an office in Virginia, Minnesota. Dr. Snyder was graduated from the Loyola University School of Medicine, Chicago, Illinois, in 1935. Before coming to Virginia, he had been in the C. C. Corps at Ely, Minnesota.

Dr. D. G. Gross of White, South Dakota, is taking over the practice of Dr. J. Tschetter in Woonsocket. Dr. Gross practiced in Woonsocket several years ago. Dr. Tschetter has accepted a government position in a camp near Hibbing, Minnesota.

Dr. J. A. McIntyre has been chosen city health officer of Owatonna, Minnesota. He takes the place of Dr. Jerome F. Smersh, who died last month.

Dr. Gilbert J. Thomas of the Nicollet Clinic, Minneapolis, was a guest speaker at the Seventh Annual Postgraduate Medical Assembly of South Texas, held November 1-3, in Houston, Texas. He also addressed students at Baylor University.

Dr. O. T. Benson of Glen Ullin, North Dakota, was honored by fellow citizens last month on the occasion of his birthday anniversary, and in celebration of his thirty-two years of service to the community. The local Lions club sponsored the showing of the moving picture, "A Man to Remember" in honor of Dr. Benson.

Dr. Moses Barron, Minneapolis, was elected president of the Minnesota Society of Internal Medicine at the meeting held in Rochester, Minn., Dec. 3, 1938. Other officers are: Dr. R. M. Wilder, Rochester, vice-president; Dr. M. H. Hoffman, St. Paul, secretary-treasurer; Dr. G. B. Eusterman, Rochester, chairman of the executive committee; Dr. E. L. Tuohy, Duluth, chairman of the education committee.

Dr. Albert Fritsche of New Ulm was elected president of the Southern Minnesota Medical association at their annual convention held in Rochester recently.

Dr. B. Sedlacek who has been in the Indian Service at Fort Totten, North Dakota, for the past 10 years has been transferred to Fort Defiance, New Mexico, where he will take charge of a large sanitarium maintained for Indians.

Dr. J. F. Norman, Crookston, Minnesota, was re-elected president of the Polk County Public Health association at the annual meeting held in November.

Dr. C. R. Canty, Butte, Montana, was elected president of the Silver Bow county medical society at a meeting, Dec. 6, 1938.

The Fourth Annual Postgraduate Institute, sponsored by the Philadelphia County Medical Society, will be held in the Bellevue-Stratford Hotel, Philadelphia, the week of March 13th, 1939. The subjects to be considered are those classified under *Blood Dyscrasias* and *Metabolic Disorders*. These will be further subdivided for convenience in instruction into 86 clinical lectures, with open forum discussion for each topic, delivered by as many individual specialists of national distinction.

At the orthopedic clinic conducted at Fergus Falls, Minnesota, last month, 110 crippled children were examined. The clinic was sponsored by the Division of Services for Crippled Children of the State Board of Control. Methods of treatment were recommended to parents. Counties represented were Otter Tail, Grant, Wilkin, Todd, Wadena, Becker, Douglas, Traverse, and Clay.

Dr. George Kaiser of St. Paul has become associated with Dr. W. E. Macklin in Litchfield, Minnesota. Dr. Kaiser was graduated from the University of Minnesota medical school a year ago and interned at the University hospital.

Dr. Robert H. LaBree, Minneapolis, has gone to Chisholm, Minnesota, where he is a resident surgeon at the Rood Hospital. He succeeds Dr. W. J. Gillesby who left for a new post in Illinois.

The Southwestern Minnesota Medical society elected Dr. J. D. Waller of Wilmont, president; Dr. B. M. Stephenson, Fulda, vice-president; and Dr. H. De Boer, Edgerton, secretary-treasurer.

Dr. L. J. Hoyer, formerly of Howard Lake, Minnesota, is now practicing in Windom, Minnesota.

Dr. D. M. O'Donnell is the newly appointed health officer of Ortonville, Minnesota.

Dr. Charles B. Cunningham of Detroit, Michigan, obstetric and gynecology specialist, has become associated with the Lenont-Peterson clinic at Virginia, Minnesota.

Dr. C. O. Erickson has been appointed assistant medical superintendent of the Rochester, Minnesota, state hospital. Dr. Erickson's appointment fills a vacancy which has existed since July 1, 1937, when Dr. Oscar C. Heyerdale retired after 38 years' service at the hospital. Dr. Erickson came to Rochester from Fergus Falls where he was assistant physician of the state hospital there. He was graduated from the University of Minnesota medical school in 1934.

The Mississippi Valley Medical Society is offering a cash prize of \$100.00, a gold medal and a certificate of award for the best unpublished essay on a subject of interest and practical value to the general practitioner of medicine. Entrants must be members of the American Medical Association. All contributions must not exceed 5000 words, be typewritten, submitted in five copies and must be received not later than May 1, 1939. Further details may be secured from the Mississippi Valley Medical Society, 209-224 W. C. U. Building, Quincy, Illinois.

Dr. J. Warren Bell has been appointed Medical Director of the National Society for the Prevention of Blindness, announces Lewis H. Carris, Managing Director of the Society. A native of Minneapolis, Dr. Bell received degrees of B.S., M.D. and Ph.D. from the University of Minnesota where he was also an instructor. Dr. Bell was formerly Director of Maternal and Child Health in Nebraska; before that, he was Director of the Division of Maternal and Child Health in Cattaraugus County in New York State.

The Pennsylvania Tuberculosis Society announces a new sound film, "Diagnostic Procedures in Tuberculosis" in which four medical authorities participate. Produced under the direction of the National Tuberculosis Association, the film was prepared especially for medical societies. Dr. Kendall Emerson, Managing Director of the National Tuberculosis Association, acts as narrator in the film. Other physicians taking part are: Dr. Ralph S. Muckenfuss, director of the Bureau of Laboratories of the New York City Department of Health; Dr. Esmond R. Long, director of the Henry Phipps Institute, Philadelphia; and Dr. Edgar Mayer, assistant professor of medicine, Cornell Medical College, New York. The film is being distributed through the loan service of the Pennsylvania Tuberculosis Society, Philadelphia.

Physically-handicapped persons under 21 years of age attended a free diagnostic clinic in Billings, Montana, recently. The clinic was open to children in Yellowstone, Big Horn, Treasure and Carbon counties. Members of the staff of the division of crippled children were present to assist parents in planning for recommended care.

Dr. Harlow B. Thompson, formerly of Ilwaco, Washington, is now practicing in Ada, Minnesota.

Erratum: In the article, "Diabetes Mellitus and Pro-tamine Zinc Insulin" (Nov. '38 JOURNAL-LANCET), Dr. A. R. Foss used material from the *Staff Meeting Bulletin* of the University of Minnesota hospitals which was prepared by Dr. B. A. Watson. Dr. Watson's name was inadvertently omitted from the bibliography.

Necrology

Dr. J. H. Moeller, 73, Maddock, North Dakota, died suddenly November 23, 1938. A pioneer North Dakota physician and surgeon, Dr. Moeller had practiced in Maddock for more than a quarter of a century.

Dr. Frederick A. Stevens, 78, of Lake Elmo, Minnesota, died November 29, 1938. He had practiced in Lake Elmo since 1887.

LEO MELVILLE CRAFTS 1863-1938

Dr. Leo Melville Crafts was born in Minneapolis in 1863 and died there September 22, 1938. His family were among the founders of Boston and his parents early pioneers of Minneapolis. He was educated in the public schools of this city and was graduated from the law department of the University of Minnesota in 1886 and from Harvard Medical School in 1890. He served his internship in the Boston City Hospital and was house physician there for one year.

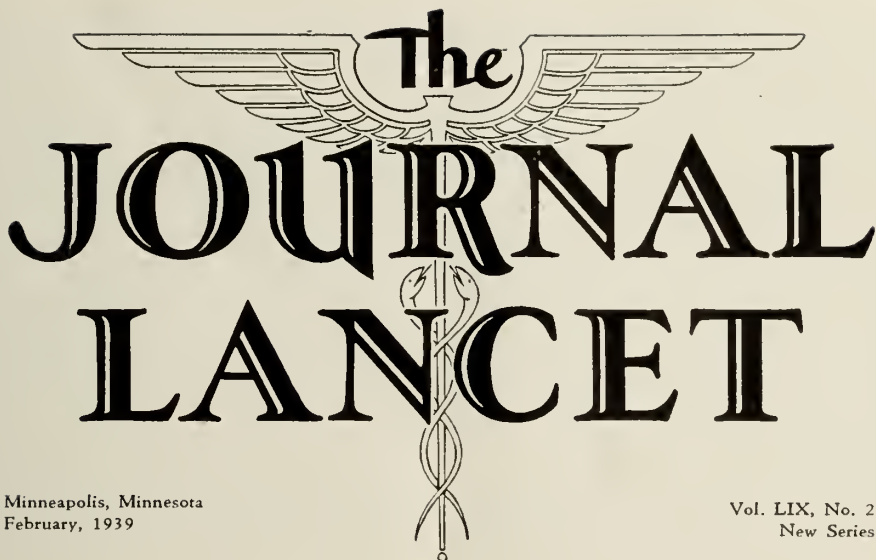
He began the practice of his specialty in Minneapolis in the early nineties, serving as professor of nervous and mental diseases in the Medical Department of Hamline University from 1893 to 1908; from 1893 to 1903 he was dean of the medical faculty at Hamline.

Dr. Crafts was a member of the staffs of most of the leading hospitals and enjoyed a very large consulting practice. He was treasurer of the Hennepin County Medical Society for two years. He was a member of the First Congregational Church of Minneapolis for fifty-five years, was active in the Minnesota State Sunday School Association, and served as its president for three years. He was a member of the board of directors of the Minnesota National Park and Forestry Association, the old Minneapolis Commercial Club, the Auto Club, American Legion and the Bloomington Golf Club. He served during the Spanish-American war at Camp Funston and later at the United States Veterans' Bureau at Minneapolis.

Dr. Crafts practiced neurology in Minneapolis for almost one-half century and was at work in his office when death came. He was well prepared for the practice of his specialty. Few men of his time had his educational background. He was a gifted teacher who was able to impart enthusiasm as well as instruction to his students. He personified the highest ideals of medical ethics. As Dean of the medical department of Hamline University, he gave a great leadership to his students and to his fellow faculty members as well. Dr. Crafts enjoyed a long and useful practice, being one of the most helpful consultants in his special field. He made many contributions to medical literature.

Dr. Crafts' kindly manner, his courteous treatment of others, his ample knowledge and his unlimited charity endeared him to his patients and his fellow doctors.

C. C. K.



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American College of Surgeons

FOUNDED BY SURGEONS OF THE UNITED STATES AND CANADA 1913

40 EAST ERIE STREET
CHICAGO

San Francisco, California
January 20, 1939

Dr. R. C. Webb
1849 Medical Arts Building
Minneapolis, Minn.

My dear Dr. Webb:

I am looking forward to your sixty-ninth anniversary issue of the Journal-Lancet, which will contain surgical contributions from the Fellows of the American College of Surgeons in Montana, North and South Dakota.

I am confident that it will reflect the excellent surgical work of the Fellows in these States and give evidence of the surgical progress of which we are justly proud.

May I offer my best wishes to the Journal-Lancet for its continued success?

Very truly yours

Howard C. Naffziger

Howard C. Naffziger, M. D.
President,
American College of Surgeons

Non-Parasitic Cysts of the Liver*

Fred F. Attix, M.D., F.A.C.S.

Lewistown, Montana

CONTRIBUTORS to the literature are generally in agreement that non-parasitic cysts of the liver give no characteristic symptomatology. Preoperative diagnosis is infrequently made and the exact pathological condition is discovered accidentally at the time of operation, when some other disease is presumed to exist. Several surgeons of wide experience have told me that they have never seen a case of non-parasitic cyst of the liver in their practice. It should be considered more frequently as a possibility in the differential diagnosis of conditions involving the right upper quadrant.

Non-parasitic cysts of the liver have been found to exist at all ages but are most frequently reported as occurring in women from 40 to 60 years of age. They are usually of slow growth which often accounts for the delay and variation in the symptomatology and, in some cases, assume importance only when such complications arise as hemorrhage in the cyst cavity¹ or torsion of the cyst pedicle.² Exploratory operation is necessary to make a correct diagnosis; to relieve the condition by surgical procedures, the methods most frequently employed are resection, partial or complete, or marsupialization. Recovery with excellent end results is obtained after operation in the majority of cases.

Moschowitz³ published the results of his extensive investigations in 1906 and concluded that the non-parasitic cysts of the liver originate in aberrant bile ducts, which he was able to demonstrate in the acini and in the capsule of Glisson. The histopathological sections of the cyst wall included with my case report seem to conform to this theory. Some authors have proposed various classifications for non-parasitic cysts of the liver. The one suggested by John F. X. Jones⁴ based on the origin of the cysts seems to be the most satisfactory and complete. Contributors to the literature during 1938 were Ochsner⁵ and McCaughan and Rassieur.⁶ Ochsner reported a case of "Unilocular Cyst of the Liver," upon which he had done a partial resection of the cyst wall with drainage (1929). One year later (1930) he reopened the abdomen and did a ventro-suspension of the uterus. The liver did not reveal any evidence of recurrence of the cyst and only a thin band of connective tissue was observed where the previous drainage tract existed. McCaughan and Rassieur presented a paper on "Non-Parasitic Cysts of the Liver: A Report of Two Cases and an Analysis of the Literature," at the December, 1938, meeting of the Western Surgical Association. Both of their patients made uneventful recoveries after marsupialization and drainage.

The complete report of my case is submitted as follows:

* Case history with illustrations used at the December, 1938, meeting of the Western Surgical Association, Omaha, Nebraska, in discussion of Drs. McCaughan & Rassieur's paper.

CASE REPORT

The patient was a housewife, age 49, height 5' 10", weight 155 pounds. *Menstrual History:* Menstruation began at age 17, a 28-day cycle of three to four days duration. The flow was scant until she reached age 30, then it was moderate. She had no pain. The past eighteen months she had noted occasional irregularity. Last normal period was February 21, 1938. *Past Illnesses or Injuries:* She suffered a compound fracture of the left tibia in 1905. This was complicated with a low-grade infection and osteomyelitis requiring sequestrectomy (1925). Prompt recovery occurred after this operation. Tonsillectomy was performed in 1912. A cesarean section in 1919; indication, a central placenta previa. She had lobar pneumonia in 1920. *Present Illness: Chief Complaint:* Four years ago first experienced a gradually increasing pressure discomfort and a sensation of constriction along the right costal margin, especially noticeable when any tight clothing was worn.

Physical Examination: The skin was smooth and clear. The muscle tone was good. Eye, ear, nose and throat were negative; thyroid was negative. There were no palpable glands. Chest was well developed and the lungs were clear. Heart was normal in size, tones regular, clear and of normal intensity. *Abdomen:* There was a firm low midline postoperative scar. The liver border was rounded and palpable six centimeters below the right costal margin. In this region there was a slight tenderness on palpation and also an increased area of liver dullness. The colon was low and not distended with gas. Pelvic examination was negative. *Laboratory Findings:* Urine: amber, clear, acid reaction, specific gravity, 1025; negative for sugar, albumin, bile and casts. Blood count: hemoglobin, 88 per cent; color index .78; coagulation time, 4 minutes; erythrocytes, 5,620,000; leukocytes, 7,450. Differential Count: small lymphocytes, 13 per cent; large lymphocytes, 10 per cent; large mononuclears, 3.5 per cent; transitional juvenile, 4.5 per cent; polynuclear, neutrophils, 64.5 per cent; eosinophiles, 4.5 per cent; basophiles, 0.5 per cent; icterus index IV; van den Bergh's test, no reaction. Blood group IV. *Gastro-intestinal Tract X-ray Series:* The stomach was in an oblique position, the pylorus open and the duodenal cap regular. No six hour residue or filling defect was noted. These were displaced laterally to the left upper quadrant. The caput coli and hepatic flexure were displaced downward and the remainder of the intestinal tract displaced to the left. A large indistinct shadow, with an irregular calcified area, was seen below the right costal margin which resembled a hydrops of the gallbladder. *Cholecystography:* (January 14, 1938, oral administration of the dye). The dye-filled gallbladder shadow was seen displaced downward and to the right. It was elongated and narrow. The calcified area was above. The indistinct shadow extended beyond the gallbladder shadow on all sides. Polycystic kidney or retroperitoneal tumor should be considered as a preoperative diagnosis. *Intravenous Urography:* (January 27, 1938). A normal left kidney pelvis filled with dye was present. The right kidney pelvis was not visualized in any of the films. *Barium Enema:* (February 11, 1938). On fluoroscopic examination the hepatic flexure and caput coli were displaced downward, the balance of the colon occupying the left half of the abdomen. There were no filling defects noted. *Preoperative Diagnosis:* The following diagnosis was made: (1) hydrops of the gallbladder; (2) polycystic right kidney; (3) mesenteric tumor.

Operation (February 28, 1938): The operation was performed under gas-ether anesthesia. The abdomen was opened through a high right rectus gallbladder incision. A dome-like grayish mass which resembled a huge hydrops of the gallbladder was present. No other viscera were seen as it filled the incision. Gauze packs were adjusted to prevent soiling, after which a trocar was inserted through the thickened wall and one thousand

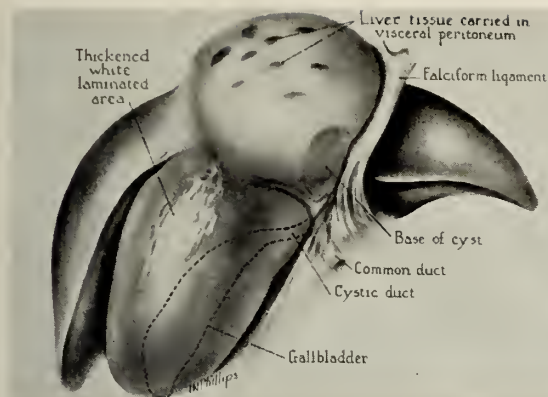


Fig. 1. The large cyst separated and displaced the lobes of the liver with the wedge-like effect of its growth. The wall was elevated on the superior, anterior and inferior liver surfaces, carrying in advance with the growth of the cyst wall the visceral peritoneal layer, which was studded with thin, isolated islands of liver tissue. The base was attached to the liver ligaments and blood vessels located deep in the hilum posteriorly and above the entrance of the hepatic ducts.

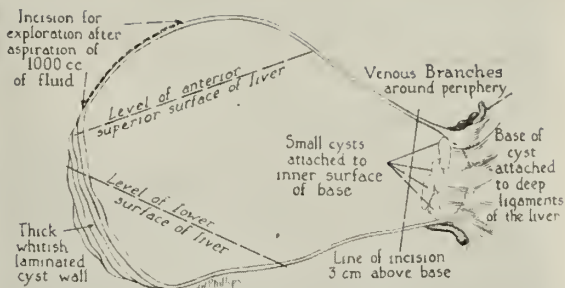


Fig. 2. Schematic Drawing of the Cyst. After aspiration of the cyst contents, the wall was incised and the left hand was inserted into the cyst cavity. This facilitated in palpating and separating the collapsed cyst wall from its cleavage to the liver tissue. Four small cysts attached on the inner surface of the base were destroyed by morcellation. Numerous venous branches of the hepatic vein surrounded the outer wall at the base.

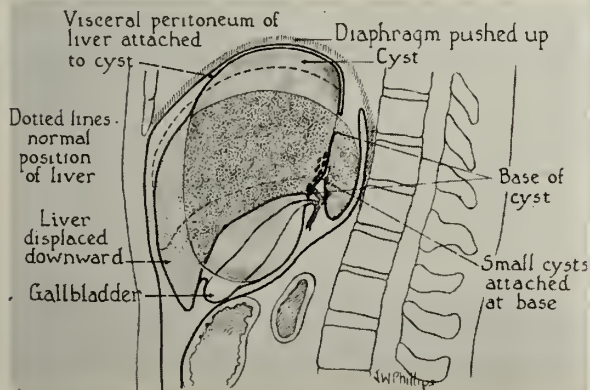


Fig. 3. Lateral View. The cyst separated the lobes of the liver and markedly displaced the right lobe laterally and downward. The elongated gallbladder was also displaced downward and backward and was attached to the posterior surface of the cyst wall by visceral peritoneal fold.

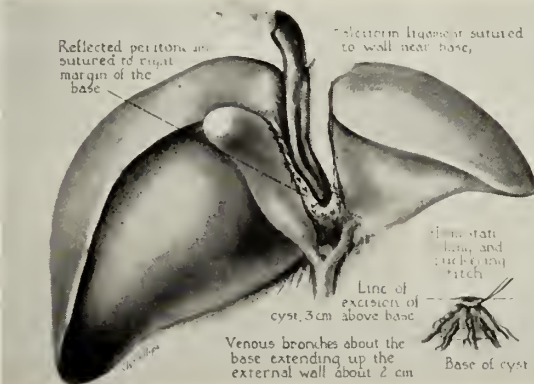


Fig. 4. The visceral peritoneal covering of the cyst wall was incised and reflected laterally. Following the removal of the cyst this peritoneal flap was used to cover and approximate the liver lobes by suturing the margin to the remaining base of the cyst. The gallbladder which was detached except the cystic duct and artery was elevated and its peritoneal flap was sutured to the liver hilum. The base of the cyst was covered by the approximation of the lateral flaps of the cyst wall. One dressed Penrose drain was placed down to the base.

cubic centimeters (1,000 cc.) of turbid, gelatinous, viscid, greenish fluid was slowly aspirated from the large cyst cavity. After the collapse of the cyst wall, an elongated mobile but otherwise normal appearing gallbladder was seen displaced downward and to the right, as was the right lobe of the liver. The duodenum and pyloric end of the stomach were displaced laterally to the left. The trocar was removed and the opening was enlarged in the wall of the cyst. The big cavity appeared trabeculated due to bands of fibrous tissue in the cyst wall. It was ascertained, by inserting the left hand into the cavity, that it extended deep in the liver hilum, the cyst wall displacing the falciform ligament to the left and also extending above the superior surface of the liver, carrying in advance a reflection of the visceral peritoneum of the liver, in which was incorporated many thin islands of liver tissue. This elevation impinged on the right antero-inferior reflection of the diaphragm. It also involved the anterior margin of the liver and extended downward to the level of the umbilicus and also along the inferior surface of the liver to a point above the entrance of the hepatic ducts which was near the source of its origin. The right lobe of the liver was displaced down and to the right by the wedge-like effect of the slowly expanding growth of the cyst. The thickened anterior wall contained an irregular area of calcification. The elevated visceral peritoneum was incised and reflected laterally from the cyst wall and, with the aid of the palpating fingers within the cyst cavity, the wall was resected

from its line of cleavage to the liver tissue, gallbladder and hepatic ducts to the source of its deep vascular and fibrous attachment in the hilum. Several short venous branches surrounded and extended up the outer wall (approximately 3 cm.) at its attachment. Within the inner wall, originating from this base, were seen a cluster of four small sessile dark-bluish cysts which were removed by morcellation. Their contents were clear, thick and gelatinous. The cyst wall was resected above the origin of the larger venous branches and the cut margin was sutured with locking hemostatic catgut stitches and approximated to cover the base. Practically a complete resection of the cysts was accomplished. The reflected peritoneal flap and falciform ligament were sutured to the base in a manner so as to approximate the widely separated lobes of the liver and provide peritoneal covering for their exposed surfaces. The gallbladder, which was attached only by the cystic duct and artery, was elevated to a normal position and its free resected peritoneal margin was sutured. A dressed Penrose iodoform gauze drain was inserted, extending from the base to the upper end of incision in the epigastric angle. The operative incision was closed in layers and three silkworm tension sutures were inserted.



Fig. 5. The stomach and duodenum was displaced laterally to the left. The caput coli and hepatic flexure was displaced downward to the pelvic brim.



Fig. 6. Intravenous Urography. Left kidney, pelvis, and calices were seen. No dye shadow was seen in the right kidney region. (Film retouched).

Postoperative Notes: There was a slight bile-stained mucous drainage for the first week. The drainage material was removed on the twelfth postoperative day, after which the sinus tract promptly closed. The convalescence was normal and the patient was discharged from the hospital on the twenty-third postoperative day. She has been in excellent health since the operation, nine months ago.

Pathological Report: One-half of the tumor tissue was forwarded to Dr. J. J. Moore, Moore Clinical Laboratory, Chicago, Illinois. His report is as follows: "The specimen consists of a 13x7x6 cm. mass of thick fibrous tissue. The walls are composed of several layers which can be separated. The 'outer' covering is thick and roughened. The 'inner' covering is smooth. The walls are laminated and are composed of thick, hyaline material. There is no gross suggestion of echinococcus daughter cysts. *Microscopic Diagnosis:* The sections consist of a hyaline and cellular fibrous tissue on the inner surface gradually changing to a tissue with few cells and then to one with dense fibrous tissue in which are occasional bile ducts and small islands of compressed liver cells. In one area are a few small cysts lined by columnar cells. There is no evidence of malignancy. Multilocular cyst of liver. Further study will be necessary to determine origin. MOORE CLINICAL LABORATORY (Signed) J. J. MOORE, M.D." *Additional Microscopic Description* (November 14, 1938): "Sections of several parts of the cyst including the walls show mostly dense hyalinized connective tissue with collections of round cells. Occasional ducts both small and large are noted lined with cuboidal epithelium. These are probably bile ducts inasmuch as occasional collections of liver cells are noted in association with them. A collection of dilated ducts is also noted. These have cuboidal to cylindrical epithelium. Likewise, the lining of the larger cyst cavity has a cylindrical and cuboidal cell lining. One cystic cavity contains degenerated lining. MOORE CLINICAL LABORATORY (Signed) J. J. MOORE, M.D." Dr. Thomas J. Walker, Walker Laboratories, Great Falls, Montana, examined the remaining portion of the tumor. His report is as follows: "Cyst removed from liver. Cyst wall is composed of connective tissue with a



Fig. 7. Cholecystography. The dye-filled gallbladder is displaced downward to the right. It is narrow and elongated. A shadow was seen that extends above and below the gallbladder. (The film has been retouched to outline the margin.)

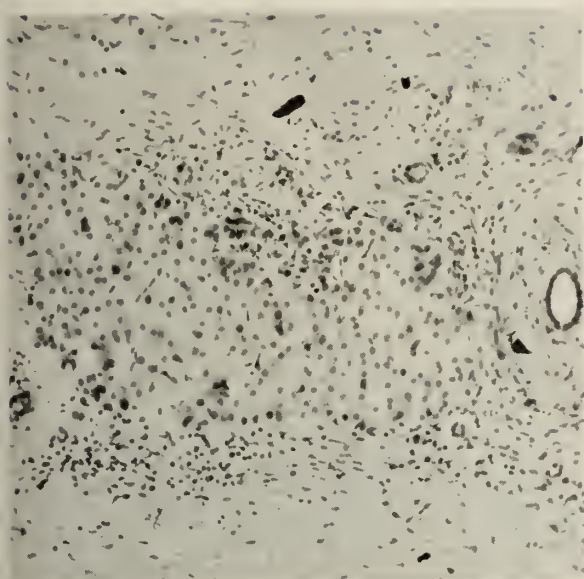


Fig. 8. Liver cells in the fibrous tissue wall of cyst with bile duct. J. J. Moore, pathologist, Chicago, Illinois.

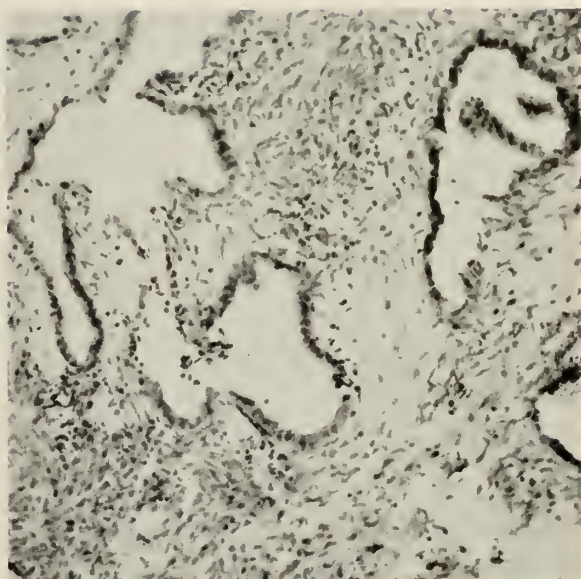


Fig. 9. Cluster of dilated ducts embedded in fibrous tissue. J. J. Moore, pathologist, Chicago, Illinois.

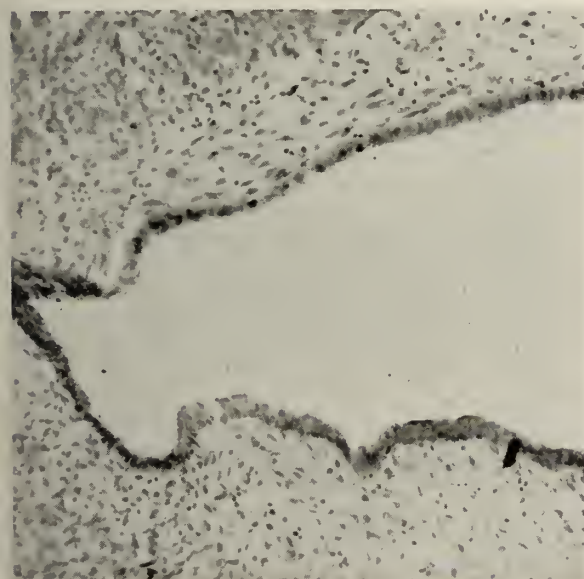


Fig. 10. Edge of large cyst showing cylindrical and cuboidal cell lining. J. J. Moore, pathologist, Chicago, Illinois.

tendency to formation of lamella. Connective tissue varies in density from dense, fibrous tissue to richly vascular, granulation tissue. I am unable to give an exact diagnosis but I am inclined to think that this is an echinococcus cyst notwithstanding the fact that no hooklets or scolices were demonstrated. (Signed) THOS. J. WALKER."

COMMENTS

1. The literature records but few correct preoperative diagnoses of non-parasitic cysts of the liver. It was not considered in the differential diagnosis of this case.
2. Bile duct retention cysts of probable congenital origin are reported with the case history.
3. Resection, partial or complete, is the method of choice, when advisable.
4. Practically a complete resection of the large cyst and a destruction of the smaller cysts by morcellation was accomplished with a prompt recovery of the patient.

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Limitations of the Non-Padded Plaster Cast

J. A. Evert, M.D., F.A.C.S.

Glendive, Montana

THOUGH plaster splints have been used in the treatment of fractures for many years, the direct application of plaster to the skin has always been considered dangerous, because this non-yielding material can so easily cut off circulation in the fractured limb. Only in recent years, after Böhler developed the technique in his clinic, has the non-padded plaster cast come into general use. Of its advantages he writes,⁶ "The treatment of any fracture has two constant requirements; good reduction and uninterrupted fixation until bony union takes place. The skill of the doctor is not usually taxed as much in the reduction of the fracture as in its maintenance in good position. In the majority of cases the non-padded plaster cast affords the best means of maintaining the fragments in good position." In the course of several years experience with non-padded plaster casts, we have been convinced that this type of splint is of material help in handling many fractures. Clinical observation, however, has shown us that the limitations and dangers of the method are important.

The following cases have been selected as showing two types of trouble which may develop from the use of these casts.

CASE 1. The patient, a 55-year-old man, sustained a simple fracture of the lower end of his right tibia. One hour after the injury, a physician applied a non-padded plaster cast, extending from the toes to the knee. The cast having been put on in the physician's office, the patient was sent home with instructions to come by train to one of our hospitals the following day. The patient stated his foot pained him severely all night. When examined the following morning at the hospital, the uncovered toes appeared white and felt cold. The cast was removed, but there was no evidence of circulation in the foot. Anesthesia extended to a line about three inches above the malleoli. The circulation did not return, making it necessary to perform a lower leg amputation three days later.

CASE 2. A male, 20 years of age, in good physical condition, sustained a simple fracture of his femur. As there was no overriding of the fragments, his physician applied a non-padded plaster cast including the hip, knee and ankle joints. The patient stated he had considerable pain in his foot the first day after the application of the cast, although he had but little pain in the region of the fracture. He was referred to one of our hospitals two weeks later because a necrotic area had developed on the dorsum of his foot from pressure of the cast. The slough was about two inches in diameter and involved all layers of the skin. (Fig. 1). After two months, the ulcer had healed sufficiently to warrant the placing of grafts over the area. This patient is at a permanent disadvantage with a skin grafted area on the dorsum of his foot.

If one is to use this type of cast, he should follow in detail the outlined technique. Even under the best conditions, one must use great care in applying non-padded casts. Schnek,⁷ who worked out this method of treatment with Böhler, has written, "We have paid dearly for our experience and I hope others will reap the benefits of it." Not only must the cast be accurately applied, but the following precautions must be observed in the selection and care of the case:

1. The cast should not be applied if there is evidence of impaired circulation in the limb distal to the break.

2. The cast should not be applied if there is extensive injury to the soft parts, or if the skin is badly injured. A small skin lesion need not prevent the use of such a cast provided the site is such that a window can be conveniently cut in the plaster to expose the area.

3. The cast should not be applied in the presence of marked edema. In some cases one may wait until the swelling subsides; in others it is best to select some different type of fixation.

4. The limb should be elevated after the application of a cast. This elevation should be high enough so that the limb being treated is entirely above the heart level in order that gravity may aid the return of blood from the part. This elevation should be maintained as long as there is any danger of swelling. We have found the method of placing the casted leg on a Braun splint with elevation of the foot of the bed to be best for enhancing its circulation. (Fig. 2).

5. The encased limb should be watched by competent nurses and doctors, experienced in this type of work. Any surgeon who applies such a cast should be willing to see his case during the night.

6. The cast should be applied only if the surgeon has had considerable experience with the use of plaster. As a beginner in surgery starts simply, so should the user of plaster start simply. When he is learning the method, only minor cases should be selected for this type of treatment; and he should be sure to see that the limb is elevated and watched even in these relatively easy cases.

7. The cast should be split if the patient complains of pain or if there is evidence of impaired circulation. It is true a split cast will not hold the fragments in as good alignment as an intact one, but as Schnek⁷ has said, "Even a pronounced deformity of the bone due to a splitting of the cast is preferable to the loss of a limb." We have found it possible in some cases to re-inforce these cut splints before letting the patient up, and to continue the treatment as originally planned. In other cases, it has been necessary for us to reapply the cast or use some other type of fixation.

8. Because pain is an important clue to the fact that the circulation of the encased limb is being impaired, the patient should not be given morphine after the application of a non-padded cast. We usually use this drug when the patient is first seen, but for subsequent discomfort he is given a mild hypnotic such as phenobarbital.

If the above precautions had been observed in the first case cited, we feel that the patient would not have lost his leg. Non-padded plaster casts should not be used for the primary treatment of patients in the physician's office. We also believe they are unsatisfactory for

the care of a patient in his home, where proper elevation may be difficult to obtain and where there are no trained assistants to see the case. It is essential to have the patient in a hospital for observation at least during the first 24 hours, and longer if there is any indication of swelling.

We also feel that this is an unsatisfactory splint for transportation. Best suited for this purpose, we believe, are the splints recommended by the Committee on Fractures of the American College of Surgeons, the Murray-Jones hinged splint for the arm and the Keller-Blake hinged half ring splint for the leg.

The after-care of a patient to whom a non-padded plaster cast has been applied should include frequent observation of the following:

1. The patient should be able to move his fingers or toes voluntarily to a slight extent. If he is unable to do this, it is evident that there is some injury to the nerves, which may be due to trauma at the time the limb was fractured or to swelling in the cast. When this lack of movement is discovered, the cast should be split immediately and further investigation should be made.

2. The patient should have almost normal sensation in the exposed digits. This may be tested by having the examiner touch some finger or toe and having the patient state which one it is. If circulation is impaired, the patient will not be able to do this, and the cast should be cut at once.

3. The most important sign to be looked for is change of color. The portion of the limb exposed below the cast should be well supplied with blood. If there is evidence of cyanosis, the cast should be split immediately.

4. Marked swelling should also be a reason for splitting the cast. A small amount of swelling may be ignored, provided the sensation is normal and the color of the digits is good.

5. If the patient complains of pain, there should be an immediate examination of the limb.

The necrosis of skin described in the second case was probably due to a change of position of the foot, after the plaster had been applied and before the cast had set, which produced wrinkles and caused uneven pressure on the dorsum of the foot. In applying casts of this type, one must be sure that the splint exactly fits the limb. The under surface of the cast should be smooth. It is, therefore, essential that there be no dents from fingers or supports in the plaster, that the bandages be rolled on evenly, and that there be no ravelled edges which would cause constriction after the plaster had set. "Circular plaster bandages should never be applied to the bare skin of cone-shaped extremities such as the leg and forearm; they should always be applied over a plaster splint."⁷ It is often advisable to use light padding over bony prominences, even though the main part of the cast is non-padded.

SUMMARY AND CONCLUSIONS

Two cases of accidents due to improper use of the non-padded cast are reported. The dangers of interference with circulation by constriction or by local pressure on the skin are described. It is urged that the non-padded cast be used strictly as a hospital procedure, where the patient may be under the constant surveillance of a trained staff. The non-padded cast is not intended for office use, for home use, or for early fixation of fractures for the purpose of transportation. A cast should be split immediately if there is any question about adequate circulation of blood in the limb.



Fig. 1. Ulcer produced by wrinkled surface of a non-padded plaster cast.



Fig. 2. Non-padded plaster cast elevated on a Braun splint. The cast has been split to insure adequate circulation in the foot.

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Impalement of the Rectum*

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POSSIBLY the first cases of impalement of the rectum reported to have occurred in this vicinity are apocryphal. A somewhat legendary account relates that in about 1850, at Crow Rock, Montana, there was a battle between the Sioux and Crow Indians, apparently brought about through a dispute over the exclusive hunting rights involving the then rich buffalo hunting grounds between the Yellowstone and Missouri rivers. At the finish of the battle, a considerable number of the surviving Crows were made prisoners. They were bound. Ash poles were obtained from a nearby creek, both ends sharpened, and one end firmly impaled into the rectum of each hapless victim who was then hoisted into the air while the other end of the pole was forced into the ground. The victors departed secure in the belief that right had triumphed in a world fraught with injustice.

Injuries of the rectum, including rupture and perforation, occur from widely diverse causes. The traumata of parturition and of attempts at delivery account for many. Gunshot wounds have not infrequently involved the rectum. The introduction of foreign bodies into the rectum, usually as a manifestation of sexual perversion, has been a rather common cause. The writer has personally removed a beer bottle, and a hammer handle, neither of which caused perforation, from two individuals, each of whom apparently inserted the object through perversion.

In a rectum already weakened by ulceration or carcinoma, the injudicious use of a proctoscope has been known to cause perforation. Zengerling reports recovery following a perforation during a proctoscopic examination in a man of 62. He also quotes Menegaux who had in 1933 collected ten cases of perforation of the rectum following proctoscopic examination, of whom five died—a timely warning that even the proctoscope and sigmoidoscope should be used with gentleness, care, and due appreciation of the anatomy of the structures involved. Extensive fracture of the pelvic girdle with marked displacement of fragments can rupture the rectum; but here much more frequently the bladder or urethra suffer injury. Even enema tips have been forced through the rectal wall in numerous instances, during the careless introduction of this object by nurse or patient.

True Impalement Wounds of the rectum are from their very nature major catastrophies. They too have occurred in many ways, probably most frequently in agricultural areas. Goring by bulls, and falls upon both sharp and blunt objects such as corn stalks, stakes, pickets, pitchfork tines and handles, shovel handles, etc., have been noted. Sharp sticks, billiard cues, etc., have caused rupture either by playful or accidental introduction. Falls from hay or grain stacks or loads, or falls from hay lofts, landing upon the upright handle of a pitchfork have been reported, and doubtless many cases

have been unreported. The collapse of a broken chair or a chamber vessel have been mentioned as causes in the literature.

PATHOLOGY

The tortuous course of the rectum as seen during a proctoscopic examination explains readily the frequency of tears or perforations when some blunt or sharp object is rapidly introduced, usually with great force. Dependent upon the course of the perforating object and the depth of its entrance, the wounds may be classified into important groups.

1. Direct impalement occurs through the anal opening. At a higher level the object then pierces or tears the rectum from within outward, usually in its passage tearing through other structures such as prostate, urethra, bladder, peritoneum, coils of small intestine, uterus, ureters, kidneys, liver, or even the diaphragm. Obviously these represent the cases of serious nature, and usually have a high mortality, because of associated injuries and, frequently, the contamination of the peritoneal cavity.

2. Indirect impalement occurs by an object piercing the skin at a varying distance from the anus. Only after traversing a variable distance of perirectal tissue does it enter the rectum from without inward. Here the damage may end or it may continue onward to again leave the opposite rectal wall at an oblique angle, after which its course may be subject to all of the vagaries of Group 1.

The angle of impact and the character of the impaling object, together with the height of the fall or the amount of force expended, all are factors in determining the character and extent of damage. As would be expected from the nature of the injury, most of the patients are males.

AGE

In the case reports available, one is struck with the fact that there are two groups of age incidence: First, the active age of late childhood and adolescence. Here, frequently the attempt to jump a fence or hedge or the playful insertion of a stick or other slender object results in the impalement. Secondly: the adult who is engaged in farm or other labor and is subject to falls such as from stacks, hay lofts, or scaffolding.

SYMPTOMS

Obviously a condition presenting such a variation of possible pathology cannot have clear-cut symptoms. If the object has entered the anus, there may be no local signs, though oftener there is some bruising or tearing evident about the anal opening. In case the piercing object entered via the buttocks, perineum or perianal regions, a skin wound at the point of entrance will be visible. Bleeding may or may not be present, either from the anus or the perianal wound of entrance, although

*From the Garberson Clinic.

the rich blood supply of the region predisposes to free hemorrhage, and severe intra-abdominal hemorrhage may be present with little or no external bleeding. This occurred in the case here reported.

Digital examination or the cautious use of the proctoscope may reveal the wound in the rectal wall. Bloody urine may indicate an associated injury to the urinary tract, most often the bladder, or urethra. Severe abdominal pain and rigidity, together with early signs of shock, are strongly indicative of peritoneal involvement and bespeak a guarded prognosis and early abdominal intervention. The absence of these findings, especially in cases with perianal perforation, tend to indicate that the perforation may have been stopped by impingement on the bony pelvis or otherwise limited, in which event local treatment from below, together with administration of antianerobic serum, may be sufficient.

PROGNOSIS

Without peritoneal involvement, the prognosis is usually good, though extensive perirectal tissue destruction may result in a prolonged disability.

With peritoneal involvement, the condition becomes grave and very high rates of mortality are given in the literature. Madelung in 1926 collected 103 cases having associated injury of the peritoneum. Of these 103 cases, 60 died. Probably the true mortality is still higher, for the condition is unusual, and few surgeons have a series of many cases. Doubtless many fatal cases have not been reported.

TREATMENT

Obviously, the first concern is to determine, if possible, whether or not the peritoneal cavity has been entered. If this catastrophe is evident, or even strongly suspected, immediate laparotomy is indicated, with suture or drainage, singly or in combination according to the conditions present. Often hemorrhage and associated contamination of the peritoneal cavity further complicate the problem. Unfortunately, the wound in the rectum usually occurs deep in the pelvis and in an inaccessible location for exposure and suture. In this event, packing and drainage may, of necessity, be used in place of suture of the rectal laceration.

Associated injuries to the bladder, small intestine, or other organs must be searched for and if present, treated according to general surgical principles. Colostomy for the purpose of shortcircuiting the bowel contents during the healing period may be indicated in certain cases.

In case the history and examination afford proof that the impalement has not perforated the peritoneum, local treatment from below may be sufficient. Cleansing and packing of the wound are indicated, though if there be extensive destruction of perianal and rectal tissues, it may be advisable to rest the parts, and spare further contamination by the establishment of a colostomy. In all cases, the possibility of inclusion in the wound of particles of clothing or other foreign matter should be born in mind.

All of these patients should receive a prophylactic dose of mixed anti-nerobic serum, unless this is contra-indicated by serum sensitivity.

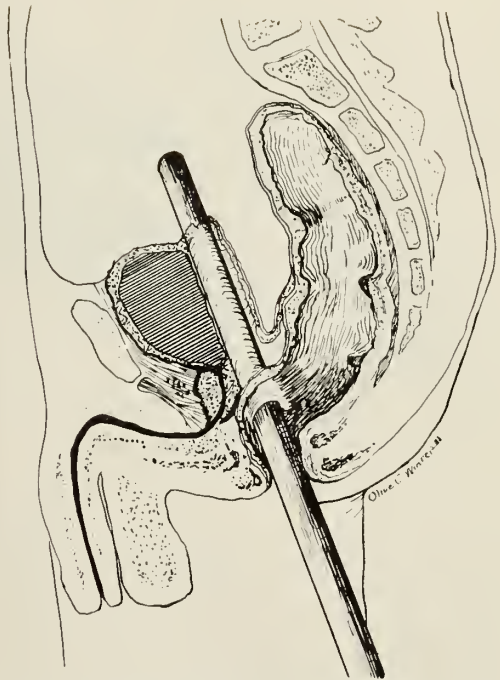


Fig. 1. Sketch showing course of impaling shovel handle in author's case. Man aged 52. Extensive laceration of rectum, prostate, bladder muscularis, and peritoneum. Widespread fecal contamination of peritoneal cavity, and marked abdominal hemorrhage. Recovery.

CASE REPORT

A male rancher, 52, was first seen by me at his home about 65 miles from Miles City on the evening of September 13, 1933. While working in a lignite coal mine that afternoon, he was standing on a shelf of shale, and prizing a heavy rock with a bar. In some manner, his hands or the bar slipped and he fell backward in a semi-squatting position. A straight-handled shovel was sticking upright in the ground behind him but on a level a few feet lower. The handle of the shovel entered the rectum for some distance and was immediately withdrawn. Pain and signs of shock were almost instantaneous. He was placed in a coal truck and transported 12 miles to his home over rough roads. About four hours later, I saw him. At that time, he evidenced severe diffuse abdominal pain and rigidity, his pulse was rapid, he was pale, and he perspired profusely. There were ecchymosis and discoloration about the anus, but no bleeding externally.

A hypodermic of morphine was given and he was transported 65 miles to the Holy Rosary Hospital. On admission, midnight, September 13, 1933, his temperature was 99.6° F., pulse 120, respiration 24, and blood pressure 100/60. Abdominal rigidity was marked and there was evidence of free fluid in the abdomen. He was catheterized and 250 cc. of clear urine was obtained. Microscopic examination of the urine disclosed a few R. B. C. Two hundred cc. of sterile water was slowly injected into the bladder and the same amount withdrawn, thus indicating that the interior of the bladder had not been entered.

A diagnosis of an impaling injury of the rectum with intraperitoneal involvement was made.

The abdomen was opened through a median suprapubic incision. When the peritoneum was opened, several hundred cubic centimeters of blood and thin fecal matter were found widely scattered throughout the abdomen. With suction and sponging, this was removed. The patient was then placed in Trendelenburg's position. Examination of the pelvis disclosed a laceration of the anterior rectal wall low down in the pelvis; the tract involved the space between the rectum and the prostate, a portion of the prostate, the muscularis of the bladder and extending upward and to the right it finally emerged through a jagged

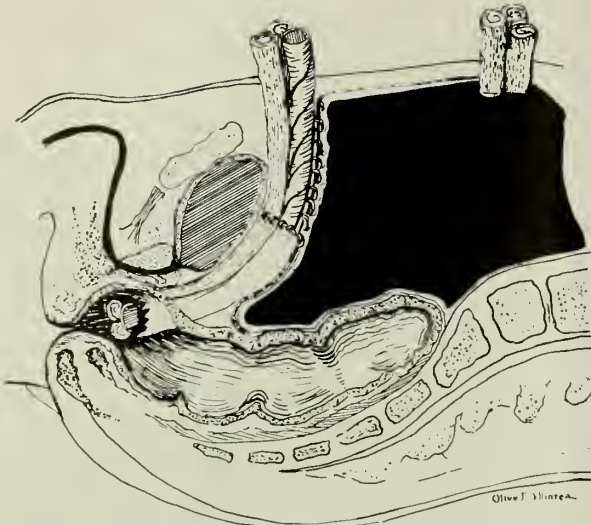


Fig. 2. Sketch showing method employed to extra-peritonealize entire injured area from general peritoneal cavity. Also showing drainage of injured tract and general peritoneal cavity as employed.

wound of the vesical peritoneum to the right of the fundus of the bladder. (Fig. 1). Examination of the other intra-abdominal organs was negative.

The location of the laceration in the rectal wall made it inaccessible to exposure and suture, and it was decided to cleanse and pack the tract, and then exclude it from the general peritoneal cavity. In general, the procedure described by Coffey for extraperitonealization of the distal bowel in his two-stage abdomino-perineal resection for cancer of the recto-sigmoid was followed. By infolding the parietal pelvic peritoneum from each side toward the midline and suturing it together there, a tube was formed. The lowermost margins of this tube were securely sutured to the posterior margins of the tear in the bladder peritoneum. This completely isolated the injured area from the general peritoneal cavity forming, in effect, a new peritoneal diaphragm continuous with the uninjured peritoneum posterior to the laceration in the fundus of the bladder peritoneum. (Fig. 2). Sufficient space was provided below this new peritoneal diaphragm for drainage to be inserted between it and the bladder.

On account of the fluid nature of the bowel contents, and the extensive laceration of rectum, prostate, and bladder muscle, it was decided to divert the intestinal stream. A muscle splitting incision was made in the left inguinal region, a loop of sigmoid colon delivered through it, and its mesentery transfixed with a glass tube. A very soft split rubber tube and two strips of acriflavine gauze were introduced through the suprapubic region, now extraperitoneal, down to the tear in the rectal wall. The general peritoneal cavity was again sponged out and 50 cc. of amfetin was introduced. Three soft split rubber tubes were inserted at about the middle of the incision which was then closed above and below the drains. A prophylactic dose of mixed tetanus and anerobic gas gangrene antitoxin was administered. The patient was placed in a high Fowler's position, and 2000 cc. of 5 per cent glucose in normal saline solution was given intravenously daily. A retention catheter was inserted.

On the next day, a Paul's tube was inserted in the sigmoid loop.

Convalescence was fairly uneventful but on the eighth post-operative day, there was definite urinary drainage through the suprapubic tract; this continued for 18 days, gradually decreasing, with a corresponding increase in the amount draining through the retention catheter. On November 22nd the colostomy was closed by suturing the opening in the bowel, and burying it extraperitoneally underneath the abdominal muscles.

The patient was discharged from the hospital December 8, 1933. The abdominal wounds were well healed, and the bladder and bowels were functioning normally.

DISCUSSION OF CASE

No claim for originality is made regarding the formation of the pelvic diaphragm of the peritoneum, but its adaptation to this purpose was original so far as known. It would seem that, in some measure, the absence of signs of peritonitis during convalescence was due to the complete exclusion of the lacerated and potentially infected area from the general peritoneal cavity. Since this technique, with slight modifications, could be used in many lacerations of the rectum with intraperitoneal involvement, even though the laceration occurred through the recto-vesical reflections of the peritoneum, it is deemed worthy of mention. In the minority of impaling injuries, the penetrating object perforates the rectum at a point accessible to accurate suturing. In this event, the peritoneal isolation as described would probably be unnecessary. However, a majority of the impaling wounds of the rectum do perforate and lacerate in a region difficult or impossible of access for suturing.

SUMMARY

1. A brief review is given of the causes of injury to the rectum.
2. Attention is called to the possibility of perforations of the rectum by proctoscope and enema tips.
3. Impalement wounds of the rectum are described and attention called to the wide variety of possible causes.
4. Symptoms and treatment depend primarily upon the presence or absence of perforation of the peritoneal cavity.
5. A case of direct rectal impalement due to fall upon a shovel handle is reported.
6. An original method of treatment adapted from Coffey's method of pelvic drainage and isolation from the general peritoneal cavity is described.
7. Colostomy was employed to divert the intestinal contents during the healing period.
8. The prophylactic use of mixed anti-anerobic serum is noted and advised in all such injuries.
9. In spite of extensive lacerations of rectum, prostate and bladder, and the presence of marked intra-abdominal hemorrhage and fecal contamination, recovery with good bladder and bowel function ensued.

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A Safer Technique in Cholecystectomy

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THE advocate of a definite technique for any surgical procedure immediately lays himself open for criticism, and usually justly so. There is a vast distinction between surgical technique and surgery. Surgery, in the only true definition of the term, must always be based upon anatomical, physiological and pathological findings. Any other definition belittles the surgeon and makes of him a technician. A good surgical technician makes a better surgeon, but a good surgical technician does not make a surgeon. In the present era of American industrial development, there is a marked tendency to the development of medical mechanics who apparently have forgotten their pathology, physiology and, sadly enough, even their anatomy. As a result, any advocacy of technique is fraught with danger.

The surgical literature has pointed out in emphatic terms, over many years, the dangers in cholecystectomy, and many articles have appeared designed to warn specifically against injuries to the common and hepatic ducts. Probably we should be frank with ourselves and not look upon injuries to these structures as surgical accidents, but placard them for what they really are—surgical tragedies. It is, of course, true that anomalies are frequent in the anatomy of the bile ducts, but when this has been so frequently and emphatically called to the attention of the surgeon, one should suppose that these injuries would be very rare, or almost completely eradicated. Such is not the case. We are, as surgeons and as human beings, creatures more or less of habit and difficult to change from our accustomed ways. Perhaps we can all remember viewing from the amphitheater the dramatic surgeon who in a few minutes with his left hand, and his back turned to the patient, spectacularly displayed before us a gallbladder, commenting during the process on how many minutes he expended in the procedure. It is to be hoped that the asbestos curtain has irrevocably dropped on this phase of American Surgery and that any surgeon aspiring to stardom in this melodrama be transferred to Hollywood where dramatics will be more in tune than in the surgical amphitheater. In order to protect ourselves from becoming too definitely technicians, it would be wise to vary our surgical procedure even when no different pathologic finding is present.

In the examination of large groups of persons, the examiner is frequently stricken with the number of right rectus incisions for appendectomy. In view of a definitely lower mortality from the use of a McBurney incision, it would appear that many surgeons use a right rectus incision routinely and not as the symptoms, signs and preoperative diagnosis should direct. It can be assumed that the abdominal procedure is likewise carried out routinely. The alert surgeon should have the

ability to immediately engage in the surgical procedure which conditions demand.

The work of Graham first emphatically directed the attention of the medical profession to the fact that gallbladder disease was secondary to hepatitis, or at least that a hepatitis always was present in cholecystitis and that cholecystotomy was a palliative procedure. While the judgment of the surgeon might correctly dictate the wisdom of cholecystotomy instead of cholecystectomy, there could be little doubt that he would later advise cholecystectomy for a logical cure of the disease. Too many cholecystotomies turned up later, symptomatically demanding cholecystectomy. Common duct obstructions brought out further complications demanding rational care—drainage by a T-tube. The failure of bile to be discharged into the duodenum led to serious changes in the whole biliary tree and eventually the liver cells themselves. Infection of the stagnant bile in the distended common duct increased the operative hazard not to mention jaundice, glycogen, chlorides changes and numerous other pathological changes of the liver.

At the present time, it can be considered basic in the surgical treatment of gallbladder disease that cholecystectomy is essential, likewise that common duct obstruction must be released and the duct drained. Since it has been conclusively shown that gallbladder disease and hepatitis are complimentary, no surgical procedure should be attempted without due regard for safeguarding of the liver. The most practical aid that can be given the liver is in the form of carbohydrates. Until a practical accurate liver function test is at hand, a 48-hour preoperative régime of a high-carbohydrate diet and glucose intravenously is a crutch to the liver, which will be greatly appreciated by the surgeon postoperatively. It is extremely rare that gallbladder disease demands emergency operative measures and undoubtedly the mortality from cholecystectomy would be appreciably lowered if none but the most extreme were ever viewed in the light of emergency cases.

Three overlapping, but nevertheless distinct eras of gallbladder surgery, have occurred. The first was the initial stage consisting of the choice of the surgeon between drainage or removal of the gallbladder. Little attention was given either the liver or the biliary passages unless a profound demand such as common duct obstruction was present. The second era, through the work of Graham and others, led to a recognition of hepatitis and cholecystotomy as a palliative procedure. The third era, being entered at this time, goes a step farther and demands more thorough common duct exploration. For this we are indebted largely to Lahey who has so admirably pointed out the cause of many cholecystectomy failures as due to overlooked common duct or hepatic duct stones. This era should not be

interpreted as license for wholesale common duct drainage, but careful palpation and aspiration are definite essentials of complete biliary passage surgery.

A review of the anatomy of the gallbladder and (particularly) the biliary passages is periodically essential. It makes little difference whether it is accomplished by reference to tests of anatomy, by cadaver dissection, or application in the surgical amphitheater. The location of the cystic artery, behind the hepatic duct, the bifurcation of the hepatic duct and the ever present possibilities of anomalies should constantly be born in mind. To the normal and the anomalous, add the pathological changes through omental and intestinal adhesion, dilated common and hepatic ducts, choledochus cysts, with double common duct (Swartley and Weeder, *Annals of Surgery*, March, 1935) and variations occasioned by previous operations. All of these conditions make up an uncharted field. Only the bravest dare clamp a structure with the appearance of cystic duct, cut it and dissect the gallbladder upward. There is a wide variation in location of the junction of the cystic duct with the common duct; this union may occur anywhere from within a short distance of the ampulla even up to one of the hepatic ducts. The neck of the gallbladder may be parallel to the common duct and be so covered with membrane that they constitute one structure. The cystic duct also may become encased in a pedicle with the common duct and proceed together visually as a common duct. An enlarged common duct may be so confusing that only with the most careful dissecting can the proper structures be identified. A recent cholecystectomy case presented a cystic duct firmly embedded to the common duct for a distance of four centimeters.

From the volumes which have been written of the variations occurring in biliary passage anatomy, further confused by pathological changes, a plea is entered for a more or less routine procedure for cholecystectomy by downward dissection. This procedure may be slower, and if the cystic artery is not previously clamped, more bloody, but it is felt that these objections are negligible if such a procedure will lessen the number of inadvertent injuries to the common and hepatic ducts.

After the abdomen is opened and the gallbladder brought into the field, the liver may be manually rotated or the falciform ligament clamped and used as a retractor to tip the under surface of the liver to a more unobstructed view. The fundus of the gallbladder is grasped with a rubber covered forcep and traction applied upward. An elliptical incision is made about the grasping forcep through the peritoneal covering of the gallbladder. With small forceps, the peritoneum is grasped and held by an assistant. The initial incision is continued down the inferior surface of the gallbladder and on to the cystic duct. Blunt dissection with small forceps is continued to free the gallbladder from the liver, clamping and cutting any troublesome bleeders. Gauze dissection is not used at any time, as it is difficult

to conceive of a more traumatic material unless it be sandpaper! As the dissection proceeds downward, another rubber covered forcep may grasp the gallbladder lower to bring the cystic duct closer in the operative field. The cystic artery should be ligated separately and doubly if desired, but it should be ligated as long as possible so that its ligated end may be finally closed over with peritoneum. As the dissection proceeds downward, the cystic duct becomes a pedicle which isolates itself from surrounding structures or at least serves as a guide to adjacent structures. The junction of the cystic duct with the common duct is clear and distinct, careful dissection along its course should never lead to injuries to adjacent bile ducts. When the junction is clearly in view, the cystic duct is doubly clamped, severed with a cautery and doubly ligated with chromic ligature, the ligature end being retained momentarily as a retractor. If any stones are palpated, or if it is felt that the common duct should be explored, it is done at this time, a complete change of abdominal moist packs being inserted as a quarantine. The exploration of the common duct should consist in vision of its size, palpation for presence of stones and finally aspiration for bile. The presence of murky flocculent bile should justify incision of the duct, for examination and exploration for stones either lower toward the ampulla or in the biliary ducts. If there is no jaundice present, the common duct is of normal size, there are no stones palpable, and the aspiration with the needle reveals clear light colored bile, there is sufficient evidence that further exploration is not necessary. The peritoneal flap resected from the gallbladder and cystic duct is sutured continuously over the stump of the duct and the ligated cystic artery, along the liver bed so that complete peritonealization of the gallbladder area has occurred. The abdomen in the absence of common duct drainage is closed without drainage, the only exception being when the gallbladder has been torn inadvertently, allowing a great deal of soiling with bile.

In common duct drainage, there are several pitfalls to be avoided: first, the incision in the duct need not be larger than to permit the insertion of the folded T-drain, or the removal of stones, and secondly, meticulous attention should be given to the condition of the rubber T-tube itself. It should be thoroughly tested and inspected before insertion to ascertain that the rubber is vital and that no leaks are present. It is quite embarrassing in attempting to remove the drain postoperatively to pull out only the upper portion!

A survey of the causes of common duct injuries and the painstaking, always disheartening task of repair, so admirably presented by Lahey, should be read by every surgeon who does gallbladder surgery. A digest of the unfortunate "accidents" of duct injuries should be a wholesome impetus to safeguard against these ever occurring again. It is with the ease of prevention of injuries, that this plea for a technique which should further guard these passages is presented.

Intravenous Urography as an Aid to Surgery

An Improved Method for Better Visualization of the Upper Urinary Tract

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WITH the development of excretory urography in the field of urologic investigation, numerous articles have become available concerning its value in renal function and in diagnosis of renal and ureteral disease. Several tests of renal function are in common use. Some of these are sufficiently complicated that the average urologist, surgeon, or general practitioner avoids them unless he has a highly trained laboratory technician available. The use of the indigo carmine test by the cystoscopist and the phenolsulphonphthalein test by the clinician give practically the same results as the more complicated tests.

The proper administration intravenously of urographic media also gives a good index of the degree of renal function present in an individual and also may give an excellent outline of the entire upper urinary tract. Therefore, although the latter procedure is decidedly more expensive for the patient, it is especially indicated where questions of diagnosis and operability arise. It is well known that failure to utilize a diagnostic procedure in common use may lead to unnecessary operations. An example is the patient who has had his appendix removed by his local surgeon because of pain caused by a right renal or ureteral calculus. Many chronic kidney diseases may manifest themselves only by gastro-intestinal symptoms and thus mislead the clinician and surgeon.

Diagnostic procedures to rule out the urologic tree as the causative factor in certain pathological abdominal conditions, such as gallbladder disease and peptic ulcer, are sometimes attended with danger, especially if catheterization of the ureters and retrograde urograms are obtained. Patients with decreased renal function or with urinary tract infections often tolerate cystoscopy and retrograde pyelography poorly, and may suffer severe reactions to such procedures. In such cases, intravenous pyelography may give exceptionable information. Dilated kidney pelvis or hydro-ureters may be well shown without a concomitant reaction, and enough may be learned from poorly functioning kidneys to warn one against extensive operative procedures on any part of the body.

Excretory urography as a diagnostic procedure seems especially indicated where urinary tract infection is known to exist. Trauma from instrumentation, even though done in the most skilled and gentle manner, is often followed by chills and prostration. Retrograde pyelograms at best are frequently followed by pain and discomfort so that although cystoscopy and pyelography are performed as an office procedure, the patient may then be sent to a hospital for 24 to 48 hours to recu-

perate. With intravenous urography correctly performed, however, the patient feels as well at the completion of the test as he did before the test was begun, so that even temporary incapacitation is not experienced.

Infection in the lower urinary tract may be carried to the ureter and kidney pelvis by the ureteral catheter. This factor is of considerable importance where tuberculosis may exist in one kidney but not in its partner. Tubercle bacilli may pass from an infected kidney into the bladder and when such urine is voided, and stained specimens show the tubercle bacillus, quite often we do not know which kidney is the offender. Cystoscopy and catheterization of the ureters can only be expected to carry organisms to the kidney not involved. The same holds true for other types of infection. Intravenous urograms frequently give enough information so that further manipulative procedures are unnecessary and the patient is saved considerable discomfort. It is, of course, readily acknowledged that retrograde pyelography is still of importance in the differential diagnosis of a small group of cases where the disease itself may be in doubt or where the lesion is exceedingly small and circumscribed so that it is not shown in an intravenous urogram. The fact remains however that the latter is the procedure of choice primarily.

These facts are generally known and appreciated by the medical profession. During the first few years after the introduction of excretory urography, the procedure was widely used. Of late, however, it seems to be the prevalent opinion that intravenous pyelography is not entirely reliable and that although it gives a good index of renal function, roentgenologic visualization is often so poor that the test is of little value. One is impressed that the latter may be true after viewing some of our colleagues' films. Such films often show poorly outlined kidneys with fragmentary visualization of the calyces and a partially filled kidney pelvis. The ureter may be visualized in only its upper or lower thirds and sometimes may not be apparent at all. Such films, while quite unsatisfactory, have their chief value in giving an estimate of the degree of renal function. By studying all the films made at the various time intervals, however, information may be pieced together to be of considerable value. Films made five or ten minutes after intravenous injection may show beginning concentration of the media in the calyces, indicating good renal function. A dense shadow of a considerable amount of the media in the bladder area shown in the early X-ray films is also evidence of good renal function, especially in those cases where very little of the media is apparent in kidneys. That really good visualization of the upper urinary tract depends upon the amount of media present there, seems

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apparent. With this thought in mind, an attempt has been made to keep as much of the media in the kidney pelvis and ureter as possible during the time interval that the first two or three films are taken. The large rubber abdominal bag used routinely in X-ray laboratories seems of little value for this and we have discarded it. Instead, firm pressure is made directly over the pelvic brim at the point where the ureters cross the bony pelvis. At the completion of the first film, after injection of the urographic media, one can usually determine the number of further films required. As soon as good visualization is obtained, the abdominal pressure is suddenly released and a film exposed during the next few seconds. The media which has been "dammed back" courses through the ureter and thus a complete visualization of the kidneys and ureters is obtained.

METHOD

The following technique has been followed during the past four years in this clinic and it is now the unusual case that does not show good roentgenologic visualization of the upper urinary tract.

If possible, the patient is instructed 24 hours previously to take a cathartic to eliminate gas and fecal material from the colon. Castor oil is most effective; if patients dislike this too much, milder cathartics may be used. A preliminary X-ray exposure of the kidneys, ureters and bladder is made for comparison with later films. If gas in the colon obscures a portion of the urinary tract, the patient is given a cleansing enema followed by pituitrin intramuscularly. Recently prostigmine has been substituted for pituitrin.

The arm band of a blood pressure machine (either mercury or spring sphygmomanometer) is folded snugly upon itself so that a rectangle 7 by 5½ inches is formed. With the patient lying straight upon the X-ray table, this folded arm band is laid crosswise on the abdominal wall so that the inferior border reaches to the pubic bone. The compression band of the X-ray machine is brought snugly across the blood pressure arm cuff and the urographic media given intravenously. Immediately thereafter, pressure in the arm band of the sphygmomanometer is raised to from 70 to 110 millimeters of mercury. This pressure varies in intensity with the body build of the patient, but is maintained for 15 to 20 minutes. About 70 millimeters of mercury pressure is sufficient for builds of the asthenic type while 90 millimeters is used for sthenic types. From 90 to 110 millimeters of mercury pressure is usually required for obese or hypersthenic types. Such pressure is enough to obstruct the ureters as they cross the brim of the bony pelvis and allows the urographic media to collect in the kidney pelvis and upper portions of the ureters. The first X-ray film is exposed 5 to 10 minutes after completion of injection of the urographic media intravenously. This film is immediately developed and examined while wet. Usually good visualization of the kidneys and upper ureters is apparent so that further films may be taken and the lower abdominal pressure released. If this is true, another film is taken (about 15 minutes after injection of urographic media) with the pressure bag in

place. Immediately thereafter, preparation is made for another X-ray and the pressure in the blood pressure arm band suddenly released and the arm band removed. Within 3 seconds after removal of the pressure, the X-ray is taken. The patient continues to lie quietly while these films are developed. Four films, including the K. U. B., are taken.

The first film (K. U. B.) shows kidney outlines and often questionable shadows such as calculi. The second film, taken 5 to 10 minutes after injection of the urographic media, with the pressure bag in place, gives an estimate of the appearance time of the media and clearly outlines the periphery of the kidneys. Often the kidney pelvis and calyces are clearly defined. The third film, taken about 15 to 20 minutes after injection of the urographic media, gives a more dense kidney outline and a sufficient amount of the media will be present to give good outlines of the kidney pelvis, calyces and upper two-thirds of the ureters. The fourth film, taken immediately after the pressure bag is released, shows the outline of the lower thirds of the ureters.

If good visualization is not present when the second film is examined, pressure is maintained and another film exposed at the end of 20 minutes. This also is immediately developed and viewed while wet. If function is at least fairly adequate, this film should show good kidney outlines, calyces, pelvis, etc. The above procedure is then continued. Further films may be taken as the case may indicate, to show stasis or for use as cystograms.

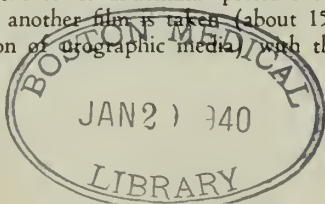
SUMMARY

The value of intravenous urography as a test for kidney function and as a surgical diagnostic aid is generally well known among the medical profession. Of late, however, it seems to be the prevalent opinion that intravenous urography is not entirely reliable and that roentgenologic visualization is often so poor that the test is of questionable value. If such visualization is poor, it often is the result of insufficient filling of the kidney pelvis and ureters with urographic media. Therefore, an easy method to overcome this weakness in the test is discussed in detail.

With such a technique, four 14x17 films are exposed for the usual adult patient. The discomfort of the procedure is only slight and there are no residual ill effects. The procedure gives excellent information regarding kidney function. As a rule, the filling of the ureters and kidney pelvis with urographic media is as satisfactory as in retrograde pyelograms or uretero-pyelograms without causing the spasm which so often results from the latter. Discomfort to the patient is not great and he feels as well at the completion of the test as he did at the beginning.

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Postgraduate Surgical Study in Edinburgh

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MANY American doctors have studied in European medical centres, but relatively few have spent much time in Edinburgh. Because of the current political turmoil in central Europe, it is unlikely that Vienna and other centres will be very popular for some time to come, and Americans wishing to study abroad will look elsewhere for instruction. I recently spent a few months studying in Edinburgh, and it has been suggested to me that a short account of the opportunities for surgical study there might be of interest. Of course, one need not leave this country to secure any form of education but it at least makes an excellent excuse to travel. The benefits to be derived will depend a great deal on the attitude of the student. He may develop a broad tolerance for other nation's ideas and customs or he may judge them by comparison with the way similar things are done at home. Too much of the latter attitude will send him back disappointed. I am afraid that some of this comparison has crept into this article, chauvinism being a hard thing to conquer.

In Great Britain, those who wish to practice as surgeons or enter one of the surgical specialties, almost invariably qualify by passing an examination for a higher degree. In the main they take the examination for admission to the Royal College of Surgeons of England or Edinburgh. The English examination is conducted in two parts, a pre-clinical and a clinical, and is considered more difficult than the other. At Edinburgh, the entire examination is taken at one time and is a written and oral test in surgery, anatomy and embryology, surgical pathology and operative surgery. Examinations are held quarterly and the number of candidates average around one hundred, of whom approximately thirty per cent get through each session. The standards are quite high and to pass, any candidate has to completely satisfy all the examiners whom he happens to meet. It seems to me that the British system of higher degrees of which there are a great many, the M.R.C.P. for internists, the M.C.O.G. for obstetricians and gynecologists, D.L.O. for otolaryngologists, etc., is very similar to our system of special boards. They serve the same function of certifying as to the competency of the candidate. Naturally there is no certain way of appraising the actual practical ability of the individual which is an inherent defect in any examination system.

Edinburgh has been a centre of learning for many years and at any given time there will be approximately two hundred graduates who are studying surgery. Americans are rarely found in this group, most of the students being British, a large percentage being from the various British dominions, colonies and dependencies. There are Australians, New Zealanders, Canadians, South Africans, Indians, occasional African Negroes and Chinese as well as English, Irish, Welsh and Scots. Let it be said here that there is no opportunity for the surgeon

to secure practical work there. The instruction available is entirely didactic with an opportunity to attend clinics. The custom is for the student to spend some time on theory in Edinburgh and some time as a house officer or resident surgeon in hospitals throughout the British Isles. Here they have an opportunity to do considerable work. The practical training in the British hospitals is usually very good. Such positions would not ordinarily be available to a non-Britisher, or to one who is not licensed by the general medical board. While in Edinburgh, students are engaged chiefly in studying for the examination for admission to Fellowship in the Royal College of Surgeons. There are no formal studies required for admission to the examination and the candidate may secure his instruction in any way which happens to suit him. Actually most of the instruction is given by various tutors. Each tutor gives a series of lectures in his subject and arrangements can be made for private instruction if desired. Such courses are, at present, not in any way connected with the medical schools and it is completely a matter between the student and tutor. With few exceptions the tutors are very capable men able to present their subject clearly and in great detail. A surgeon giving lectures on surgery will also dwell on pathology, embryology and anatomy. Classes are held wherever the tutor (who pays the rents) can find accommodations. The hardiness of the Scots is as well known as their frugality so one finds classes being conducted in the most barn-like halls. In the winter the less hardy students will be wearing overcoats and mufflers. One such place known as Temperance Hall was particularly unprepossessing. Temperance Hall belongs to the local total abstinence society which, judging from my observations, is a distinctly unpopular and poorly patronized fraternity. To reach the hall one ascended a narrow winding concrete stairway decorated at few intervals by broken panes of glass. The equipment consisted of a few hard benches, a temperamental black board and one of the most unique and futile heating systems it has ever been my sorrow to meet. This consisted of a small gas jet with a tiny boiler which theoretically warmed an ordinary steam radiator. Of course, the fire was only lit when the class began and was extinguished immediately on the close.

Apart from the absence of creature comforts, tutors make every effort to give good courses and by and large they are good. That is to say if one wishes to thoroughly cover the subject of surgery, including orthopedics, anatomy and related pathology he will do so in considerable detail in an amazingly short time. As students are studying to take the examination for Fellowship in the Royal College of Surgeons of Edinburgh, the courses are, in essence, cram courses for them to bone up the required knowledge. Students also spend some time in the pathological museum of the Royal College of Surgeons. The

museum is well housed and the various specimens displayed so that they are quite accessible. One may learn a great deal of gross pathology in this museum, which is essential for the examination.

Clinical teaching is carried on in the Royal Infirmary, where the University of Edinburgh provides, for a small fee, a series of daily clinics. Students are also required to secure hospital tickets which entitles them to the privilege of visiting the operating rooms and wards. The leading surgeons of Edinburgh are in attendance and devote a great deal of time to teaching, much of it being undergraduate instruction. Sir John Fraser conducts a weekly undergraduate clinic where he goes over cases with students. His clinics are instructive and always well attended. Upwards of two hundred people crowd the amphitheatre so that standing room is at a premium. The hospital is always full and the surgeons are usually able to present large series of cases of unusual conditions. They may also arrange for a number of outpatients or old patients to be present. Some of these people will have been under observation for many years, perhaps all their lives, so one is able to observe the course of a disease and the results of various methods of treatment. Such material, ably presented, makes the time spent there well worth while. The Royal Infirmary of Edinburgh has the distinction of being the first of the voluntary hospitals in the British Isles and during its long existence many distinguished men have worked there. The present surgeons are justly proud of their heritage although veneration of the old is carried rather farther than seems necessary. In this respect, the physical equipment of the hospital could be much improved by a radical modernization operation. Doubtless, lack of sufficient money explains why many needed improvements have not been made, but certainly the love of things as they are, or as they were, is a factor to be reckoned with. Nevertheless, it is a noble pile of stone and much good work is being done within its walls.

Other hospitals in and about Edinburgh are not so highly organized for teaching purposes but are well worth a visit. In particular, the Royal Hospital for Sick Children in Sciennes Road has a large surgical service under Mr. Wilson and Miss Hershberger. The Princess Margaret Rose Orthopedic hospital in charge of Mr. Cochrane is most interesting for several different reasons. It is a voluntary hospital supported, in part, by subscription but also by various local government units who pay a per diem sum for each patient. It is the centre of an organization for the care of orthopedic defects in children with a most admirable administrative setup. They conduct a clinic at the hospital and control numerous subsidiary clinics in surrounding local communities. These clinics are a permanent organization consisting of a local doctor, public health nurse and in most cases a trained physiotherapist. Orthopedic surgeons visit the outlying clinics on occasion. Thus they have complete control of the cases which are sent in for care and of those cared for locally as well as the follow-up and after-care. The hospital itself is a very modern institu-

tion with swimming pool and all facilities for physiotherapy. The institution is located on a hill outside of the city where the air is keen and bracing. To ensure that the youngsters get plenty of air, all the wards are completely open at one end, with no way whatever of shutting out the breezes. The ward looks very fine but the blue noses and ears of the patients and hands of the nurses do not. In this connection, I recall making rounds in the children's ward of another hospital where one of the patients was so blue that it was supposed that he was receiving sulfanilamide. Incidentally, the matron or head nurse very much resented any insinuation that it might be just a trifle chilly.

The Panel system of practice in Great Britain has had a profound influence on hospitals and medical care in general so that a short discussion of it might not be out of place in this article. Much has been written both pro and con about this scheme and I suppose a great deal depends upon the point of view with which one approaches the subject. I do not pretend to any profound knowledge of such a controversial question but I gained certain impressions from various people whom I met. I think most people are more or less familiar with the general idea of the panel setup, though some of the more rabid enthusiasts seem to have little understanding of it as they talk of it as a system which provides complete medical care. Actually all the scheme sets out to do is to supply general practitioner service in the office or home to a specified group of low income wage earners. Each panel practitioner has a list of persons not exceeding 2500 to whom he supplies this service. For this, he receives from the insurance fund a capitation fee, of about \$2.25 per year for each name on his list. The advantages of the plan to the practitioner, who may also have a private practice, are that he is paid for caring for a group of people who would otherwise receive free care; that his income is stable and predictable and that he has something worth while to sell if he wishes to dispose of his practice. The insured individual has the advantage of medical care whenever required, without thought of the expense involved, from a doctor of his own choosing. The plan is open to the following criticisms:

1. The doctor with a large panel cannot spend much time with each patient. The practice of prescribing with little or no examination is said to be very common.
2. Also, of course, he is bound to have a lot of time used up in seeing people with trivial complaints, filling out papers and dealing with malingering. This, of course, is bad for both doctor and patient.
3. A serious defect is the fact that the families of insured persons are not included. They are cared for by the doctor on a private fee basis and if the head of the family would have difficulty in paying for medical care for himself it seems doubtful that he would be able to pay for that given his family.
4. From our point of view the panel system is undesirable because of the lack of provision for specialist and hospital care. These must be provided by

the voluntary hospitals, supported by donations. They are completely unable to keep up with the demand for services and are unable to secure sufficient funds for expansion. Invariably a voluntary hospital will have a long waiting list. Beds are always full and non-emergency cases may have to wait a year or more before a bed is available for them. The voluntary hospitals care for most of the surgery in panel patients, either as in- or out-patients. Most panel practitioners do not treat any fractures, incise abscesses or do any surgery whatsoever; they simply refer the patient to the out-patient service of the hospital. The hospitals are staffed by honorary (non-salaried) attending men and by residents and interns. Much of the work is done by residents and interns who have an opportunity to get a lot of practical experience during their service.

Resident surgical officers tend to be rather critical of their practitioner brethren and among them one finds some of the most caustic critics of the system.

A fundamental consideration often forgotten in any scheme of medical care is the sort of people with whom one is going to deal. There is a wide difference in the attitude of the British people so aptly dubbed by Margaret Halsey the "ungentry", and the same class of people here. Erwin Edman speaks of "The good natured endurance of the English underprivileged," and "The cynical good nature of the Cockney temperament." In other words, these people have put up with their lot without complaint, do not expect it to be greatly improved and are content to go along making the best of it. It seems hardly necessary to point out that this is not a prevalent attitude among American patients either privileged or underprivileged. In summary one may say that the British Health Insurance plan fulfills precisely the purpose for which it was planned. The plan provides general practitioner service in the office or home, and anyone who may laud it as a complete medical service shows a woeful lack of knowledge of present-day requirements for good medical care.

As I have mentioned, actual conditions of study requires the endurance of a certain amount of physical discomfort. Likewise, living conditions as a whole leave much to be desired. Disapproval may just as well be kept to oneself; no amount of verbal effort will result in any change. Rabelais' injunction, "to spare your breath to cool your porridge," is well worth remembering whenever one becomes filled with a missionary zeal to show people the error of their ways. The real difficulty is that during the winter there is no practical attempt made to supply that external warmth to which we are so accustomed. The British have a peculiar conception of warmth. With them it is largely a visual phenomenon, sensations of warmth not, apparently, being perceived

through the integument. Thus, so long as they can see a flame they are warm. The attempt to heat a large room by a tiny open fireplace can only be described as ludicrous and to attempt to explain the virtues, economies and comforts of the modern furnace only makes the explainer appear ludicrous to them. At a hotel, which boasted a hot water heating system, just now, I endeavored to demonstrate the proper method of getting some heat out of the radiators. My plan was of the simplest, merely that some sort of a fire more than a mere candle flame be kept under the boiler. I succeeded only in getting my ears beaten back, politely but definitely.

Much has been written of English food, mostly derogatory. Let me say here that it is quite possible to sustain life on English food, and as the human race is very adaptable, to become accustomed to it. Margaret Halsey, in her witty book, *With Malice Towards Some*, well describes it when she says, "I have never been able to understand how they pried it up long enough to get a plate under it." She also puts forward the hypothesis that in every English hotel there is a corps of "blower offers" who work on the food as it passes from kitchen to table. Certainly they must work a double shift in the mornings and concentrate on the toast. Actually, there as elsewhere, while the average family or restaurant diet may not be very appealing, there are plenty of places where one finds excellent food (and drink).

Edinburgh is a lovely old city with a rather distressing similarity of architecture, all the buildings being of the same type of stone. There are many historical places of interest including the Castle and Holyrood Palace. Standing as it does on the summit of a rocky peak overlooking the main business district on Princess street, the Edinburgh Castle is an imposing spectacle, especially on the rare nights when it is illuminated by flood lamps. The overhanging pall of smoke which has earned the city the name of "Auld Reekie" and the numerous foggy rainy days give the winter visitor a poor impression. In fact, all British cities have a rather gloomy appearance, but the beauty of the countryside more than compensates for this. In the district surrounding Edinburgh there are innumerable places of scenic or historical interest which anyone will enjoy visiting. There are the beautiful Trossachs, Loch Lomond and many another Loch, the heather-covered hills, the gild gorse with its showy yellow flower, ruins of old abbeys such as Dryburgh and Jedburgh, the bleak and desolate Lammermoor and many another. The great literary heroes of Edinburgh are Walter Scott, Robert Burns and Robert Louis Stevenson and one is frequently reminded of them and their writings. One has only to recall the many beautiful places visited, especially in the South of England, to say with Cowper, "England with all thy faults I love thee still."

Ectopic Pregnancy*

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ECTOPIC pregnancy is the abnormal implantation of a fetus outside the uterus. The importance of early recognition and treatment is essential in order to maintain a low mortality. Ectopic pregnancy presenting the classical symptoms may be difficult to diagnose, but many cases show atypical signs and symptoms which are confusing and the diagnosis is missed. I have reviewed 166 of our own cases, the analysis of which is the basis of this presentation. Anatomically, the location of ectopic pregnancy is in the ampulla, the isthmus or the interstitial portion of the tube, and in rare instances in the ovary and abdominal cavity. Two of the total number of cases reported were in unmarried women. One was diagnosed acute appendicitis and the other was readily recognized, in spite of the fact that the patient was too sick to give a coherent history; in the latter case, however, all the classical symptoms were present. This is just a reminder that one must not be influenced by the social status of the patient.

Tubal pregnancy is thought by some to be due to some interference with the passage of the ovum from the fimbriated end of the tube to the uterine cavity. The most commonly accepted cause is pelvic inflammatory disease following venereal infections, abortions and normal deliveries. In the series, only one definite history of gonorrhoea was reported, so this "socialite" can be dismissed as a causative factor. There was one abortion in 29 patients; two in eight; and three abortions in two. The remainder gave no history of miscarriage or postpuerperal complications. Other causative factors are adhesions, presence of pelvic tumors and tubal diverticulum. The operative findings in the 166 cases do not clearly reveal any definite pelvic abnormality. However, one patient had a fibromyoma and in 26 cases ovarian cyst of varying size was present, which may have been the cause of the angulation of the tube, thereby delaying the movement of the ovum. From these findings I do not believe that one could positively state that the causative factors have been determined.

The following brief case history will illustrate the questionable causative factors.

On June 15, 1936, at 12:30 A. M., the patient became ill with pain and spotting which lasted one day. Menstruation was overdue one week. During the night she developed more severe pain in her lower abdomen, especially in the left lower quadrant. The pain was intermittent in character. Examination showed a well developed, overnourished woman in pain simulating that of labor. Temperature was 98.6°, pulse 70. Lungs and heart were normal. Abdominal examination revealed a marked tenderness in left lower quadrant with some resistance. There was some pain in the right lower quadrant. Deep pressure referred the pain to the left lower quadrant. A diagnosis of ectopic pregnancy was made. She was sent to the hospital and was operated on that morning.

The surgical findings were that of a right tubal abortion with a hemorrhagic cyst in the right side. The peritoneal cavity con-

tained free blood. Both tubes were apparently normal except for bleeding about the right ovarian cyst which was five centimeters in diameter. A right ovariectomy was performed and the abdomen closed.

The patient made an uneventful recovery until December 28 when she again developed pain in the abdomen, more on the right side, with spotting. Temperature was 100°, and pulse rate 100. The patient was uncomfortable on account of lower abdominal pain. Manipulation of the cervix produced severe pain. A diagnosis of ectopic pregnancy was made. However, in view of the fact that her symptoms were comparatively mild and she had had a tubal abortion before, we were under the impression that a similar condition existed and that we should procrastinate. The leucocyte count varied between 8,000 and 16,000. One week following her original examination, she had a definite mass in her right lower abdomen. She was again operated on and at this time there was a ruptured tube on the right side at the isthmus. A right salpingectomy was performed and the patient made a very satisfactory postoperative recovery.

The question arises in this case as to the etiological factor. The patient had, of course, had a period of sterility following which she had two abnormal implantations of an impregnated ovum. The first time it apparently was only a tubal abortion and the attending surgeon definitely stated, from his exploration, that there was no inflammatory process present. Both tubes were left *in situ*. Within a period of six months she again became pregnant in the same tube in which she had had a tubal abortion, without showing any malformation or any infectious process on the opposite side.

From this case, one readily sees that the etiological factors are still in question. However, the patient's general appearance and overweight showed that she had an endocrine disturbance and led one to suspect that there was an ovarian functional disorder which readily could have caused her unfortunate disturbance.

Ten patients, or six per cent of the cases, had two ectopic pregnancies, of which two never had had any previous pregnancy and two had had abortions previous to their tubal pregnancy. All the others had had previous pregnancies and also had pregnancies following their first ectopic one. In these cases, the pathological report gave no evidence of previous inflammatory process. Perhaps hormonal disturbances could be considered an etiological factor. It has been said that an unusually long period of sterility often precedes an ectopic pregnancy. This is true in some cases. However, it would appear from the following that primary sterility is not the rule. Previous total sterility was found in 35 cases. The largest number were in the one child sterility group for a period of years preceding the ectopic pregnancy. The number of pregnancies varied from one to fifteen. The greatest number of ectopic pregnancies were in the one and two pregnancy types. The age range was from 17 to 47 years, the average being 29½ years. The majority were between 21 and 30 years and 63 occurred between the ages of 31 and 40.

There is perhaps no acute abdominal lesion in which the clinical history is of so much value in making the

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diagnosis as in ectopic pregnancy. The severe, tearing pain in the affected side with fainting and dizziness is the classical sign of the so-called acute ectopic pregnancy. However, there are no absolutely set signs and symptoms which are arranged so as to make an inevitable diagnosis of ectopic pregnancy. Pain is the most constant symptom. It is variable depending entirely on the amount of bleeding that has taken place and the more bleeding intraperitoneally the more pain. Pain was a constant factor in all of the 166 cases. The reflex, or shoulder pain from subdiaphragmatic irritation due to the free blood in the peritoneal cavity was recorded in 30 cases. Vaginal bleeding, another early and impor-

tant symptom, was recorded in 136 patients in this series. The bleeding varied in amount and regularity. The characteristic bloody discharge is usually dark and occurs sometime after the normal menstrual period. The patient often remarks about the unusual character of the flow; it is unlike hemorrhage in color and quantity, and not excessive like that of an abortion. Ectopic gestation should always be suspected when there is a history of vaginal bleeding following delayed or missed menstrual period, especially when preceded or occurring with pain.

Thirty-three patients complained of dizziness and fainting. Forty-nine had nausea and vomiting, perhaps due to the peritoneal shock, and 16 had nausea only. The early signs of pregnancy, such as morning sickness, did not occur. The nausea and vomiting usually followed the acute attack of pain. In most of the cases where there was profuse intraperitoneal hemorrhage the pallor of the patient was out of proportion to the hemoglobin reading and the red cell count. The hemoglobin usually drops after the patient has had more than one intra-abdominal hemorrhage. The degree of shock is usually out of proportion to the amount of blood loss. The blood pressure reading is of importance only when the pressure is known before this surgical accident, but in our recorded cases the systolic pressure was persistently low and in only one case was the blood pressure unobtainable. Cullen's sign, a bluish discoloration about the umbilicus, was not mentioned in any of this series. It is an inconstant sign, found only where there has been a large intra-abdominal hemorrhage.

Ninety-one of the ectopic gestations occurred in the right Fallopian tube and seventy-four in the left. This is, perhaps, of no special significance, but the differential diagnosis is more difficult when the pregnancy is present on the right side. The laboratory data showed the red count to vary little from the normal. The leucocyte count varied from 5,000 to 40,000, the majority being between 8,000 and 10,000. The leucocyte count is of some value in the differential diagnosis of pelvic inflammatory disease. It is advisable to make counts early and repeat them a number of times in order that they may be of most diagnostic value. A sedimentation rate has not been performed uniformly, but many cases in this series are before the advent of this test. It is of value early in aiding in the differential diagnosis between ectopic gestation and acute inflammatory disease, but it must be remembered that after the third month of pregnancy the sedimentation time may become rapid.

Vaginal examination should be done with the greatest gentleness and with very little manipulation. This examination revealed marked tenderness in 47 patients and a tender mass in the posterior culdesac in 92. Twenty-five gave only questionable information. Many cases showed marked tenderness upon motion of the cervix.

Ectopic pregnancy must be differentiated from acute appendicitis, threatened or incomplete abortion, acute salpingitis, normal pregnancy, ovarian cyst with twisted pedicle, and hemorrhage of the ovary.

Every case of ectopic pregnancy requires immediate surgical intervention as soon as the diagnosis has been

TABLE 1
Age Incidence

Youngest	17 years
Oldest	47 years
Average age	29½ years
17 to 20 years	6
21 to 30 years	91
31 to 40 years	63
41 to 47 years	6

TABLE 2
Location of Pregnancy

Right side	91
Left side	74
1 in left horn of bicornate uterus, perforated.	

TABLE 3
Number of Previous Pregnancies

0 pregnancy	38
1 pregnancy	32
2 pregnancies	30
3 pregnancies	18
4 pregnancies	18
5 pregnancies	9
6 pregnancies	3
7 pregnancies	2
8 pregnancies	1
10 pregnancies	3
11 pregnancies	1
15 pregnancies	1
Unknown	10

TABLE 4
Symptoms

Pain abdominal	165
Pain shoulder	30
Dizziness and fainting	33
Nausea and vomiting	49
Vaginal bleeding	136
Nausea (no vomiting)	16
(1 case had no history of illness given).	

TABLE 5
Blood Picture

percent	Red Count		Leucocytosis			Blood Pressure	
	No. of Cases	Count in Millions	No. of Cases	Count in Thousands	No. of Cases	Blood Pressure	No. of Cases
1-30	1	1.5-2.0	1	5-6	3	45/38	2
1-40	5	2.0-2.5	3	6-7	9	60/45	1
1-50	3	2.5-3.0	10	7-8	13	70/50	3
1-60	14	3.0-3.5	11	8-9	11	95/60	4
1-70	22	3.5-4.0	15	9-10	12	100/70	7
1-80	12	4.0-4.5	8	10-11	6	110/80	9
1-90	7	4.5-5.0	1	11-12	8	120/80	5
		5.0-5.5	2	12-13	9	125/90	4
				13-14	5	135/68	3
				14-15	5	150/100	3
				15-16	2		
				16-17	8		
				17-18	5		
				18-19	4		
				19-20	3		
				21-22	2		
				22-23	1		
				23-24	1		
				24-25	3		
				25-26	1		
				27-28	1		
				40-	1		

made. Morphine should be given for relief of pain pre-operatively. Intravenous medication may be given while the surgical team is preparing for the operative treatment. Usually by that time the patient has recovered from her first shock. Surgery should be done through the abdominal route and the ruptured tube removed. In this series all had a salpingectomy and in addition 132 had curettage. Nineteen had no curettage. There was no pathological report in 100 and decidua was reported in 28, while five showed normal endometrium. Transfusions are beneficial and in this series ten cases were given such treatment. Eight patients had one transfusion, one had two, and one had five transfusions.

Three of the patients had postoperative infection, one an abscess in the abdominal wall and two had pelvic abscesses which had to be drained through the posterior culdesac. There were three deaths, a mortality of 1.8 per cent. One patient died shortly after operation, apparently from circulatory failure. One died from ileus and peritonitis and one from intestinal obstruction.

CONCLUSIONS

1. The etiology of ectopic pregnancy is still in question.
2. Pelvic pain and bleeding are the most constant symptoms.
3. Most common vaginal finding is pelvic tenderness and tenderness on motion of the cervix.
4. No pathognomonic sign is present.
5. Complete and accurate history is most valuable.
6. Laboratory data aids in the differential diagnosis.
7. Surgery is the only method of treatment.

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Penetrating Foreign Body Wounds of the Knee Joint

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THE treatment of infected wounds of the knee joint, especially relative to drainage, was outlined forty years ago by W. S. Halsted¹ of Baltimore. In discussing a paper at the American Surgical Association in 1898, he made the following statement: "I cannot endorse the views as to drainage of the knee joint. We rarely put drains of any kind into knee joints even though they are infected. A drain can relieve tension but it cannot dispose of all the organisms of an infected joint; the tissues have to take care of these in a large measure and they can do this better without a drain than with it. A drain produces invariably some necrosis of the tissues with which it comes in contact and enfeebles the power of resistance of these tissues toward organisms, but given necrotic tissue plus infection a drain becomes almost indispensable."

The above opinion which was based upon years of scientific observation and study is today generally accepted as correct by most surgeons. While it is always a temptation to place a drain into an infected cavity, the lessons learned during the World War in caring for large numbers of infected knee joints reemphasized the wisdom and sound judgment of Halsted's statement.

In 1916 Willems² of Belgium recommended that drainage of knee joints be instituted by long bilateral parapatellar incisions followed at once by active motion. He was particularly opposed to the use of any drains

placed in the joint cavity and to any form of immobilization.

While the insertion of drains down to but not entering the joint cavity has been universally accepted, the question as to whether immobilization or mobilization of the joint should follow arthrotomy is still a subject of controversy. Those who consider the control of infection paramount, advise rest by immobilization of the joint in an extended position plus light traction, while those who believe restoration of function most important, favor early active motion of the joint. Each method has its own advocates and opinion is still divided as to which is the more effective. A brief survey of the literature³ demonstrates that, generally speaking, European surgeons appear to favor active motion as a postoperative measure, while American surgeons are inclined to prefer rest by immobilization of the joint and traction in a splint.

The sole purpose of the following case report is to call attention to the fact that all forms of drains placed into the knee joint should be avoided, and that satisfactory final results can be accomplished in certain types of infected knee joints by employing active motion following arthrotomy.

CASE REPORT

A healthy and well nourished woman of 27 years slipped and fell in a hay loft striking her left knee against the floor.



Fig. 1. Lateral view of knee showing position of broken nail in the knee joint. The shadow marked with an arrow is a lead marker placed over the small entrance wound.



Fig. 2. Anterior-posterior view of knee showing position of nail and also site of entrance wound marked with an arrow.

The resulting wound seemed very trivial; it did not bleed very much and was considered hardly serious enough to necessitate medical attention. She consulted Dr. J. A. D. Engesather of Brocket, North Dakota, a few hours following the accident. A small punctured wound just below and lateral to the patella was cleaned and dressed and a prophylactic dose of antitetanic serum was administered. The following day considerable swelling had developed and it was very difficult for her to stand on her leg because of pain. Forty-eight hours following the accident, because of the increasing severity of the symptoms and findings, her physician X-rayed the knee and a large broken nail was found to be within the knee joint cavity.

On admission to the Grafton Hospital the same day, her temperature was 102° and she appeared sick and in pain. The left knee joint was distended with fluid and very tender on palpation especially over the lateral aspect of the joint. A single punctured wound was present anteriorly at the lower level of the patella. Attempted motion of the joint was painful. X-ray films of the knee demonstrated a large broken nail lying within the joint cavity and to the lateral side. The suprapatellar pouch was aspirated with a large needle and a cloudy hemorrhagic fluid was obtained. Under spinal anesthesia, a longitudinal parapatellar incision four inches long was made on the lateral surface of the joint. Special care was taken not to cut into the muscles of the thigh. The joint was opened and a large amount of cloudy hemorrhagic fluid was released. A foreign body (about one-third of a rusty nail including the head) was removed and the interior of the joint was irrigated with warm normal saline solution, a small piece of detached cartilage being washed out. No drains were introduced into the joint but the wound in the soft tissues was held apart by vaselin gauze. (Usually even drains in the soft tissues are not necessary if long incisions are employed.) No immobilization was carried out, and following the operation, the patient was encouraged to flex her knee daily as much as possible.

Her convalescence was uneventful. The swelling and tenderness in the joint rapidly subsided, the temperature remained around 102° for three days and then gradually decreased; drainage from the joint was not excessive except the first two

days. The gauze pack in the soft tissues was removed on the fourth postoperative day. The patient was released from the hospital on the tenth postoperative day, at which time the wound was rapidly closing and motion in the knee was nearly complete.

CONCLUSIONS

1. A penetrating wound may be the entrance point of a foreign body. The foreign body may be a large one regardless of how the wound is obtained or even if the patient is certain that no foreign body is present. X-rays should never be omitted, for they often reveal the presence of an unsuspected foreign body.
2. Infected knee joints are emergencies and should not be temporized with by employing aspiration.
3. Early arthrotomy is advisable but drains should not be inserted into the joint cavity.
4. Active motion of the knee joint following incision and drainage is the best method of avoiding ankylosis of the joint. This can be accomplished by an overhead sling which the patient can pull himself, thus flexing the knee and expressing the pus.

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Pseudocysts of the Pancreas

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TWO cases of pseudocysts of the pancreas are here reported. The first case is of interest since I saw the cause, acute pancreatic necrosis, and eight months later operated upon the cyst. The second case is of interest because it simulated gastric cancer.

CASE REPORTS

CASE 1. Mrs. M. W., age 36, for four years had suffered attacks of pain in the right upper quadrant which lasted a day and were accompanied by vomiting. She entered the hospital February 24, 1938, because an attack, which had begun the day before, was more severe than her previous ones and was growing worse instead of better. Her temperature was 100°, pulse 100, respiration 20, WBC 21,000. The following day her WBC had dropped to 10,100 but she was otherwise the same. There was marked tenderness, accompanied by muscle spasm, in the right upper quadrant. With the diagnosis of acute gallbladder disease, operation was done under spinal anesthesia. The findings were: a large amount of slightly bloody serum; liver markedly swollen and mottled; gallbladder large, thin, and containing many calculi; pancreas very hard and swollen. There was a very congested area studded with the yellow spots of fat necrosis in the tissues near the head of the pancreas. The gallbladder was emptied and drained, and a Penrose drain was placed down to the pancreas. Diagnosis: moderate acute necrotic pancreatitis with gallstones. The operation seemed to have done little to help her, and it was three weeks before her fever dropped to normal.

During the latter part of her hospitalization, she described a soreness in her left epigastrium which persisted. Gradually she began to complain of gaseous distress and left epigastric pain that extended between her shoulders in the back with occasional vomiting. On November 1, 1938, eight months after her operation, her symptoms had increased and a large rounded mass, somewhat to the left, was seen and felt in the epigastrium. A skiagraph was made and a pancreatic cyst diagnosed. She was operated upon three days later.

The operation was done under spinal anesthesia. The empty stomach was stretched like a ribbon around the left anterior side of a large cyst, perhaps twice the size of a large grapefruit. Aspiration above the pyloric part of the stomach of a large amount of clear fluid allowed the cyst to be grasped and opened. The remaining fluid, brown and thick, contained many small pieces of necrotic tissue and was removed by suction. Inspection of the interior of the cyst revealed at the base an area about 2½ inches long by an inch wide of dark gray necrotic tissue. This was the area of necrotic pancreatitis that had produced the cyst. A piece of the wall of the cyst was taken for microscopic examination, and the incision into the cyst was closed around an inch-wide tube. The cyst was then stitched to the peritoneum and the wound closed. Drainage was free and many small necrotic pieces came away, and once a much larger piece was picked out of the tube. At present the discharge is much less and a smaller drain tube is in place. Later, when the discharge becomes clearer, this will be removed.

CASE 2. Mr. O. McC., age 49, had run his automobile at high speed into a telephone pole, wrecking the car and badly bruising himself, two years before I saw him. One year later he began to suffer from a dull heavy pain across the lower chest. At times the pain was quite severe and often seemed to cause vomiting. Cholecystograms showed a poorly functioning gallbladder. He was not seen again for eight months; by then he was greatly changed. He had lost forty pounds and looked emaciated. Suffering from a steady epigastric distress, he ate very little and then usually vomited. A large mass extended

*From the Dakota Clinic, Fargo, North Dakota.

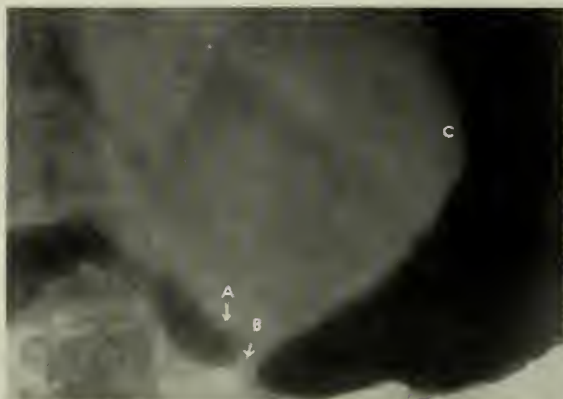


Fig. 1. A. Depression of the duodenal cap.
B. Pyloric ring.
C. Lesser curvature.



Fig. 2. Microscopic Examination: "The wall is of connective tissue lined with endothelium. There are many capillary blood vessels and some lymphocytes. Diagnosis—pancreatic cyst."

across the epigastrium. There was no free hydrochloric acid shown by fractional gastric analysis, and his Wassermann test was negative. With the X-ray examination showing a large filling defect in the stomach, it was thought that he was suffering from a malignant tumor.

The operation was done under ethylene anesthesia. A large mass, slightly elastic to touch, extended from the diaphragm to below the stomach level. There were many adhesions of the various organs. Correcting the diagnosis to cyst, a large amount of brownish fluid was removed by aspiration above the stomach, the sac opened, and the emptying completed by suction. On inspection of the base, it was found that the sac seemed to come from the head of the pancreas, but there was no necrotic tissue. Since no line of cleavage of the sac wall was found, it was closed tightly around a rubber tube and the sac sutured to the abdominal incision. Recovery was uneventful and for the past three years he has experienced no further trouble from

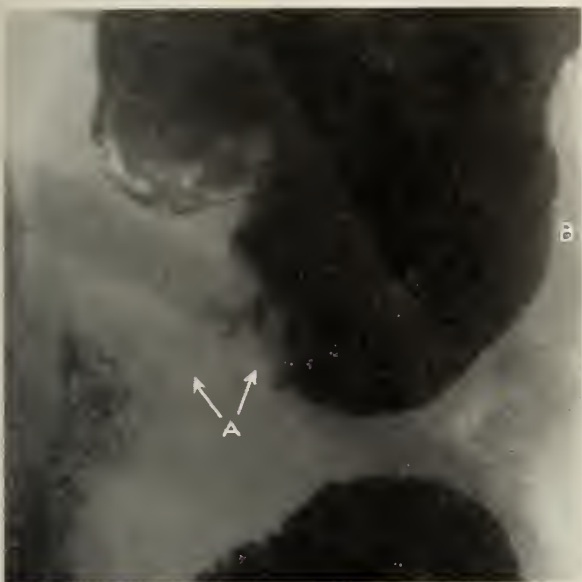


Fig. 3. A. Deformity of the antrum.
B. Greater curvature of stomach.

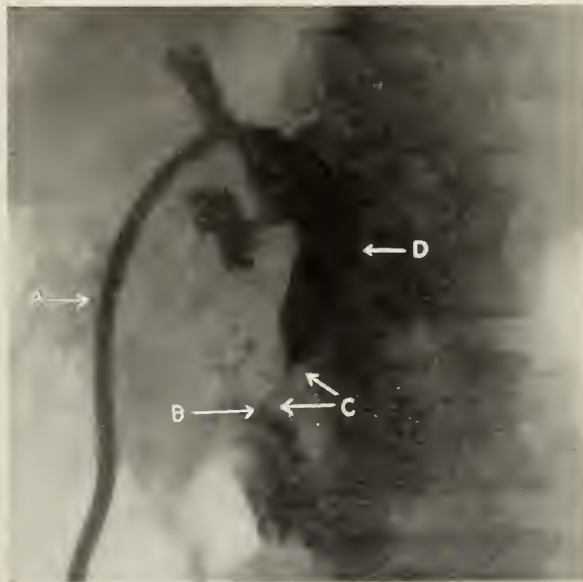


Fig. 4. A. T-tube in common duct.
B. Region of Vater's papilla.
C. Spasm of sphincter of Oddi.
D. Dilated common bile-duct.

his cyst. Section of the cyst wall showed no epithelial lining, "but dense fibrous tissue with a few lymphocytes and fibroblasts—probably a cyst of the pancreas."

DISCUSSION

The neoplasm of the pancreas most often occurring is carcinoma of the head of the pancreas. Some of the other tumors are so rare that merely to mention them is sufficient. These are hydatid cysts, dermoid cysts and congenital cysts. The latter are small and often associated with cystic disease of the kidneys and liver. There remain, then, three pancreatic tumors which are of importance: the rare retention pancreatic cyst, lined with epithelium, the rare adenomatous type lined with epithelium and often with solid elements in it, and the pseudocyst lined with endothelium.

The adenomatous tumors may be solid tissue or mostly cystic in character. The solid adenomas have become of great interest since they may cause grave hypoglycemia, and the hypoglycemia can be cured by removal of the tumor.

The retention pancreatic cyst is caused by obstruction of a duct within the pancreas, and the gradual collection of pancreatic fluids behind the obstruction. At least in the earlier part of its existence it is lined with epithelium.

The pseudocyst is next to carcinoma in frequency. As the name indicates, it is not a true cyst of the pancreas, but is formed in the following way: When trauma or a localized necrotic pancreatitis causes destruction of a

part of the gland, the fluids that accumulate rupture into the retroperitoneal space, and a pseudocyst is formed with peritoneum as its covering. True cysts grow slowly, pseudocysts comparatively rapidly. Automobile accidents are likely to increase the number of pseudocysts.

The manner in which acute necrotic pancreatitis is caused is interesting. While Dragstedt advanced the theory that it is due to acute infection of the pancreas, most of the students of the subject agree that retrojection of bile and pancreatic enzymes from the common duct into the pancreatic duct and so into the pancreas, is the cause. Here the inert trypsinogen in some way is converted into trypsin, and autodigestion of the pancreas follows. Opie in 1901 gave the first description, and showed that the retrojection was caused by a gall-stone obstruction at the ampulla of Vater. At the present time iodized oil is often injected through a T-tube following common duct drainage and the duct visualized. Frequently an obstructing spasm of the sphincter of Oddi is seen, and not infrequently the backing up of the oil into the pancreatic duct.

Spasm of the sphincter of Oddi with retrojection of the common duct fluids into the pancreas and autodigestion is now the most accepted cause of acute pancreatic necrosis. Treatment of pancreatic cysts is surgical. Pseudocysts are emptied, inspected, drained and sutured to the wound. True pancreatic cysts can be cured in the same way; however, if there are solid elements within the sac these should be destroyed by cautery or the thought of removal of the entire cyst wall considered.

Accurate Determination of Compatible Blood for Transfusion *

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THE subject of blood transfusion is or should be of considerable interest to the whole medical profession because every practitioner, regardless of his specialty or the general nature of his practice, is confronted from time to time with ailments which call for or render imperative the intravenous administration of blood. A generation ago the actual transplantation of blood from donor to recipient was still in the experimental stage and was a technical problem, which was so difficult as to render almost negligible the number of transfusions which were attempted. The simple solution of this problem transformed the situation so completely that today transfusions are performed without difficulty everywhere by a large and ever increasing number of physicians and surgeons with such gratifying results in most instances that the inherent dangers are frequently lost sight of, or are too little appreciated. In fact, the simplicity of the citrate method has been cited as a disadvantage because it places the transfusion of blood into unreliable and dangerous hands.

It is a fact that severe and fatal reactions are being reported from large and important medical centers where accurate data are recorded, and that here these disasters are a matter of very serious concern. What the situation is in hospitals and private practice conducted without sufficient or even any laboratory facilities, is a matter of conjecture. Without doubt, it is less satisfactory than in the more favored places. The following quotation from a letter written by a physician¹ and printed recently in the *New England Journal of Medicine*, emphasizes the occasional occurrence at least of these untoward reactions. "Within the past two years it has been my sad privilege to see in consultation at five different hospitals in and around Boston as many serious transfusion accidents. The first four were fatal; the fifth undoubtedly would have been had not the surgeon immediately withdrawn the needle when the reaction occurred. . . . Since this is solely my own experience, it is certain that other such serious accidents have occurred in this and nearby communities, and that most of them have probably gone unreported."

Investigation of these alarming and fatal complications rarely discloses etiological errors of technique committed in the operating room or at the bedside. Unskilful performances in the withdrawal and administration of blood seldom result in anything more serious than temporary failure of the patient to receive the blood. The cause of these disasters is usually found in errors of laboratory technique and interpretation pertaining to typing and compatibility tests. No mistakes in clin-

ical laboratory procedures can possibly give rise to more serious results. Adequate and practical laboratory safeguards are now available for this work. Therefore, every typing and compatibility test should be performed and interpreted with sufficient perfection to prevent the selection of an incompatible donor. This requires laboratory facilities and trained technicians which many hospitals do not possess. Even fairly good and complete equipment with technicians who have had recognized training does not insure dependable laboratory work. The more exacting and complicated tests require for accuracy the supervision of the laboratory by a thoroughly competent clinical pathologist. There is no substitute for any deficiency in this respect which is safe for the patient, and which should be satisfactory to the clinician. Laboratory procedures in general are becoming more important in every-day practice, and at the same time alarmingly more dangerous when imperfectly performed. It is evident, therefore, that wholly unsatisfactory conditions prevail for the safe selection of compatible donors in many places where the transfusion of blood is not infrequently performed. It would be interesting to conduct investigations among the responsible personnel of those institutions where transfusion deaths have occurred, to learn how seriously or how lightly they view such occurrences which "can only be due to flagrant negligence or sheer ignorance." A cause for some of this ignorance is to be found in the failure of most standard text-books of surgery and laboratory diagnosis in the hands of medical students and recent graduates to reflect the safest and best information relative to the selection of a donor. Instruction, too, in most of our medical schools is not at all sufficient to enable the medical student, or intern, to make an accurate compatibility test by himself upon which the life of the patient depends. The laboratory service of the internship is completed by many who fail to receive adequate training there, either because it is not required of them or is not available. The laboratory technician likewise fails, not infrequently, to receive training sufficient for the accurate performance of these tests.

The negligence which occurs must always rest primarily upon the clinician in charge of the case, and upon whose authority the laboratory work is carried out and the transfusion performed. It is his duty to safeguard his patient against the common and remote hazards of these procedures. A critical attitude of mind should be adopted in order to detect errors due to ignorance or negligence on the part of the technician or intern, or any other individual who plays a responsible rôle. Strange as it may seem, the clinician may not only fail to interest himself in these matters upon which the

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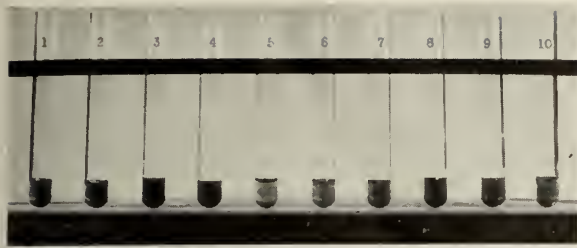


Fig. 1. Photograph of the rack of ten test tubes sometime after completion of the mixtures. Final reading for agglutination and hemolysis is made only after the expiration of 1½ hours.

Tubes No.	1	2	3	4	5	6	7	8	9	10
Donor's Erythrocytes 1—20 Dilution	0.1	0.1	0.1	0.1	0.1					
Donor's Serum				0.4		0.1	0.2	0.4		
Recipient's Erythrocytes 1—20 Dilution						0.1	0.1	0.1	0.1	0.1
Recipient's Serum	0.1	0.2	0.4						0.4	
Physiological Saline Solution	0.8	0.7	0.5	0.5	0.9	0.8	0.7	0.5	0.5	0.9

Fig. 2. This chart shows the exact content of each of the ten tubes employed in the compatibility test.

life of the patient depends, but may actually become impatient over the delay necessary for accurate laboratory determinations.

A recent survey of blood transfusions in America conducted by questionnaire mailed to about 700 hospitals approved for internship under the authority of the Blood Transfusion Betterment Association of New York City, netted 350 replies which indicate, according to Levine and Katzin³ that in the selection of compatible donors 5 depend upon blood grouping alone, 30 upon direct matching alone, and 310 upon both grouping and matching. The universal donor is used at least occasionally in nearly two-thirds of these hospitals and in 69 of them frequently.

Until six years ago the procedure followed in the clinical laboratory of Trinity Hospital, Minot, consisted of blood grouping followed by cross matching on a cover slip of the donor's and recipient's corpuscles and serum, with examination at intervals during a 20-minute period to determine the presence or absence of agglutination. This work was done by graduate technicians from good schools under the supervision of a clinical pathologist. Severe transfusion reactions were not uncommon during this time. This procedure was terminated following a fatal hemolytic reaction which occurred soon after Dr. P. J. Breslich became director of the laboratory. He introduced another method, the description of which is given further along in this paper. It has proved to be uniformly satisfactory in the selection of donors for more than 1,200 transfusions.

Blood grouping alone by means of known serums fails in accuracy occasionally because of weakness of the titer of either the serum iso-agglutinins or of the iso-agglutinogens of the cells tested. The resultant error usually places in Group IV according to the Moss nomenclature members of the other three groups. The allowance of too short a time for the agglutination reaction may give

rise to the same mistake. The final reading should be delayed for at least an hour, particularly in the case of infants or young children. The presence of subgroups of agglutinogens also causes errors in blood grouping and compatibility which are not revealed. Furthermore, blood grouping of this type fails to indicate the presence of isohemolysins which may not only vitiate the test and thereby give rise to trouble indirectly, but may themselves be the cause of severe and fatal reactions.

The evidence just presented against blood grouping alone is sufficient to condemn this procedure as dangerous and inexcusable.

Direct matching as usually practiced, consists in testing upon a cover-slip the agglutination reaction between the cells of the donor and the serum of the recipient. This examination fails completely to give important information concerning the reaction between the cells of the recipient and the serum of the donor. Errors may occur due to weakness of the titer such as has already been described. Hemolysins are not identified by this technic nor are subgroups prevented from causing serious mistakes. Cross matching or the additional testing of the agglutination reaction between the donor's serum and the recipient's cells is an added safeguard of considerable value, but it is still deficient as usually carried out on a cover-slip because of its shortcomings with respect to weakness of titer, subgroups and hemolysins.

In the light of our present knowledge of subgroups of iso-agglutinins and iso-agglutinogens and the mistakes in grouping which these anomalies give rise to, the employment of the universal donor can no longer be viewed as a safe procedure even upon theoretical grounds. It has already been pointed out that these errors usually result in placing members of the other three groups into the so-called universal donor class, a serious mistake always but particularly so where universal donors are still used. Interns as a class cling to the belief in universal donors and thereby give proof of the deficiencies of their instruction on this subject while medical students. The universal recipient should likewise be rejected because of the anomalies just mentioned and the resulting errors of grouping. The danger of insufficient dilution of an incompatible serum is another reason for this unfavorable attitude. Abramson⁴ reported in THE JOURNAL-LANCET three years ago a death due to hemolysis which resulted from the transfusion of a so-called universal recipient with blood of a different group.

The technic introduced into our own laboratory by Dr. P. J. Breslich is a modification of the Landsteiner test tube method. Preliminary typing is carried out in order to reduce to a minimum the number of test tube compatibility tests necessary for selecting a donor. The typing and cross matching are not directly involved in this final determination which concerns only the reactions seen in the test tubes.

Ten test tubes are arranged in numerical order in a rack. Fig. 1. Into each of tubes 1, 2, 3, 4 and 5 is placed 0.1 cubic centimeter of a 5 per cent saline sus-

pension of the donor's erythrocytes. To each of tubes 1, 2 and 3 is added the recipient's serum in the following amounts respectively: 0.1, 0.2, and 0.4 cubic centimeters. Four-tenths of a cubic centimeter of the donor's serum is added to tube 4. Into each of tubes 6, 7, 8, 9 and 10 is placed 0.1 cubic centimeters of a 5 per cent saline suspension of the recipient's erythrocytes. To each of tubes 6, 7 and 8 is added the donor's serum in the following amounts, respectively: 0.1, 0.2 and 0.4 cubic centimeters. Four-tenths of a cubic centimeter of the recipient's serum is added to tube 9. Physiological saline solution is added to the 10 tubes in amounts sufficient to make the content of each equal to 1 cubic centimeter. In tubes 1, 2, 3, 6, 7 and 8 occur the cross reactions between the serum of both the donor and the recipient in three different dilutions and their erythrocytes. In tubes 4, 5, 9 and 10 occur control reactions between serum and erythrocytes of the same origin in saline solution and between the saline solution and the erythrocytes alone of both the donor and the recipient.

Blood in the amount of 10 cubic centimeters is withdrawn for the examination. To 2 cubic centimeters are added potassium oxalate crystals to prevent clotting. The serum from the remaining portion is recovered after separation from the clot. The oxalated blood is centrifuged and the cells removed. They are washed in physiological saline solution three times to rid them of serum. The final packed cell mass in the centrifuge tube is converted into a 5 per cent suspension by the addition of physiological saline solution.

After preparation, the tube mixtures are allowed to stand for 1½ hours. Delayed reactions are not uncommon. Incompatibilities, if present, are usually apparent within 40 minutes but, for absolute safety, the full 1½ hour observation period is necessary. In approximately 4 per cent of tests between bloods of the same group incompatibility is found which is usually due to agglutination but occasionally to hemolysis. If the macro-

scopic evidence of agglutination is at all doubtful, a rare event, a microscopic examination is carried out.

This test tube method has been relied upon at Trinity Hospital for all of the more than 1,200 transfusions performed during the last six years. There have occurred no reactions of incompatibility whatsoever to disturb either the patient or the physician.

The extra time and effort which this test requires is fully justified by its incomparable superiority as a laboratory procedure upon which life depends.

CONCLUSIONS

1. The transfusion of incompatible blood is still a cause of an appreciable number of deaths in this country.
2. The transfusion of incompatible blood is inexcusable and is always due to "flagrant negligence or sheer ignorance."
3. Text-books, medical schools and clinical laboratories fail, as a rule, to enlighten medical students and interns regarding the safest and best methods of determining blood compatibility.
4. The dangerous belief in the existence of a safe universal donor is almost fanatically indulged in by most interns and many practicing physicians.
5. The methods of determining blood compatibility commonly employed in this country are manifestly inadequate and are frequently performed by poorly trained and inexperienced physicians and technicians.
6. An absolutely safe and practical method of selecting compatible donors is available to all properly trained medical men and technicians.

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The Treatment of Ruptured Duodenal Ulcer

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EARLY diagnosis, quick decision and good surgical judgment are urgent in the care of ruptured duodenal ulcer. As so often happens, the onset may occur shortly after the ingestion of a large meal with the consequent spilling of quantities of food into the peritoneal cavity, or may occur following prolonged physical exertion which reduces resistance by exhaustion. The patient who has suffered a perforation will usually be lying down in the so-called jackknife position with the thighs in extreme flexion. His facial expression is one of great anxiety and he may have superficial signs of shock. A history of indigestion may or may not be elicited. The patient will generally state that without warning he was seized with a sudden severe pain in the right upper quadrant of the abdomen which was quickly referred to the lower quadrant on the same side. He will probably complain bitterly of pain in the right shoulder. The most constant and characteristic symptom is the generalized board-like rigidity of the abdominal muscles. An X-ray picture revealing a gas bubble beneath the diaphragm is corroborative of the above findings.

There are two questions which must be decided after the diagnosis is made: (1) what to do; (2) how to do it. The initial question is answered very easily, the treatment necessary being obviously surgical. The second question, "How shall we do it?" has two answers, one radical and one conservative. Each has its advocates and each numbers among its followers some of the outstanding surgeons of America.

A conservative group advocating simple closure of the perforation believes that the mortality is lower and that fully 65 per cent of those so treated will receive a complete cure; of the remaining 35 per cent, 10 to 15 per cent will require gastroenterostomy for obstruction, and 20 per cent will need dietary supervision because of gastric distress. Those in the less conservative group who favor closure of the perforation with immediate gastroenterostomy contend that the mortality is likewise reduced. They also contend that gastroenterostomy aids in the healing of the ulcer and helps in preventing postoperative leakage and hemorrhage, as well as insuring a more comfortable convalescence.

Pyloroplasty and partial gastrectomy following closure of the rupture, each has its champions but the results do not appear to be as satisfactory as in the other types of operation. With the exception of those cases in which it was very evident at operation that obstruction was present, we have in our own practice employed the operation of simple closure, believing that with a patient so desperately ill the quicker one "gets in and gets out" the better the patient's interests will be served. We also were influenced in adopting the simple closure for these cases because of the long accepted thought that perforation

meant cure. A continuous suture placed at right angles to the long axis of the bowel will close the perforation with a minimum of encroachment on its lumen. We customarily follow this by suturing a pad of fat over the site of the closure.

The question of drainage of the abdomen following operation for perforated duodenal ulcer is likewise debatable. It is our practice never to drain under eight hours and not then if there has not been too much soiling of the peritoneal cavity. We are influenced somewhat in our decision by the condition of the patient's mouth and throat as regards sepsis. It has been frequently shown in the laboratory that hydrochloric acid inhibits the growth of bacteria and, since high acid content is the rule in duodenal ulcer, it would follow that peritonitis from this source should be of minor importance. It is felt by many that drainage of the abdomen increases the hazard of bowel obstruction as well as the incidence of postoperative hernia and it has been shown that improperly placed drainage tubes have been followed by duodenal fistula.

The postoperative management of these cases is of great importance. Since the advent of the Wangenstein nasal siphonage, it has been our practice to use it in every case. The patient is far more comfortable, upper abdominal distress is reduced to a minimum and fluids may be given by mouth freely. We feel that this procedure has been a considerable factor in lessening the indication for immediate gastroenterostomy. On the fourth day, the sippy diet is begun but no alkalis are given. Following the sippy diet, the patient is gradually taken over to a bland semi-solid diet on which he is requested to remain for six months. He is advised to take milk in between meals for the same length of time. Smoking and alcohol in any form are indicated just about as much as alcohol and a shotgun on a hunting trip. We feel that one is almost wasting his time trying to successfully treat anyone who smokes or drinks alcoholic beverages.

Since 1932, twelve patients have been operated on for perforated duodenal ulcer at McKennan Hospital in Sioux Falls, South Dakota. All twelve patients were males and they ranged in age from 23 to 50 years. There was an immediate mortality of $8\frac{1}{3}$ per cent, one patient dying on the seventh day of pneumonia. Of these twelve patients, seven were operated upon within eight hours of the perforation, and five after eight hours had elapsed. Drainage was instituted in exactly half of the cases. Simple closure was performed in all, though they fell on the services of five different surgeons. Delayed gastroenterostomy was done on only one and this was two months after the primary closure. It was necessitated because of uncontrollable pain and obstruction. Aside from the fatal case of pneumonia, there was only one other complication. This occurred in a case that

was not operated upon until twelve hours following the perforation. On the seventeenth day, the wound was found wide open and a secondary closure was done. The patient left the hospital on the twenty-sixth day in good condition. A follow-up questionnaire revealed that two patients are still required to restrict their diet. The remaining ten are eating as they wish and are free from symptoms.

CONCLUSIONS

We believe with Dr. Robert F. Sharer of Oak Park, Illinois, that if primary gastroenterostomy or any of the

other more radical operations are to be combined with simple closure, these operations must do one of two things; reduce the primary mortality or improve the end results. Though the series of cases presented in this brief article is relatively small, our findings do not indicate that more extensive surgery is necessary. Only one patient died and that one from pneumonia on the seventh day. Gastroenterostomy could not have helped him. The one patient on whom secondary gastroenterostomy was later performed, might have avoided the second operation had the more radical procedure been followed in the first place.

Actinomycosis of the Head and Neck*

Pathology, Diagnosis and Treatment

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A STUDY of the pathology of actinomycosis makes one realize the futility of potassium iodide and similar therapeutic measures often used in the treatment of the disease. In this paper an endeavor will be made to show the close relationship between the pathology and treatment (primarily surgical) of actinomycosis.

In man, the ray fungus (Israel type) is usually considered the ordinary cause of the disease. The common pathogenic form, *Actinomyces bovis*, is anaerobic, and has great resistance to heat, light, drying and disinfectants. Due to the fact that it is extremely difficult to culture the pathogenic form, this method of diagnosis is not practical.

MEANS OF IDENTIFICATION

Because the clinical history and physical findings in most cases are not pathognomonic, one must depend almost entirely on laboratory findings for a final diagnosis. The sulphur granules are quite visible to the naked eye. They have a radiating lobulated structure which is quite characteristic. They are best obtained by straining the pus through several layers of gauze. The granules are translucent, sulphur yellow or brown in color. They are best removed as a wet preparation made with strong sodium hydroxide on a glass slide, crushed and stained with Gram's solution. The lobulated colony with gram positive mycelial filaments may be distinguished under the low power microscope. The most reliable method in the writer's experience consists of centrifuging a large quantity of pus and embedding the sediment in paraffin. Sections are cut and stained with

hemotoxylin and eosin, and with Gram's solution. Characteristic colonies as in Figure 1 are then sought. Biopsies from an area of liquefaction will generally show the granules. If they are taken from a dense indurated area without suppuration, the organisms will probably not be found.

A very interesting clinical pathological characteristic of actinomycotic abscesses and nodules is that although they may be quite large, tender and fluctuant, upon aspiration or incision they may be found to contain a very small amount of pus. This is important also from the diagnostic standpoint. Frequently, the first one to see these lesions and to aspirate or incise them has the advantage. Although only a few cubic centimeters of pus are obtained, this may contain the colonies while all subsequent punctures yield a dry tap or produce no granules, because they frequently drain out in a short time. In some instances, it is very difficult to obtain the organism in pus from a sinus of long standing. One, therefore, should save all the material obtained from the first aspiration and study it both by smear and by stained sections for the characteristic colonies.

PORTAL OF ENTRY

There is considerable difference of opinion regarding the mode of the actinomycotic infection. Two principal theories have been held for many years. The first, proposed by Bostrom and very widely adopted, is written into almost all the textbooks and is accepted without absolute proof. He claims that the causative agent has its normal habitat on grasses, grains and straw, and gains entrance into the body by way of abrasions in the mucous membranes of the gastro-intestinal tract. From a saprophyte in old sod soil, it gains access to the grains

* Studies from material of the surgical department, University of Minnesota.

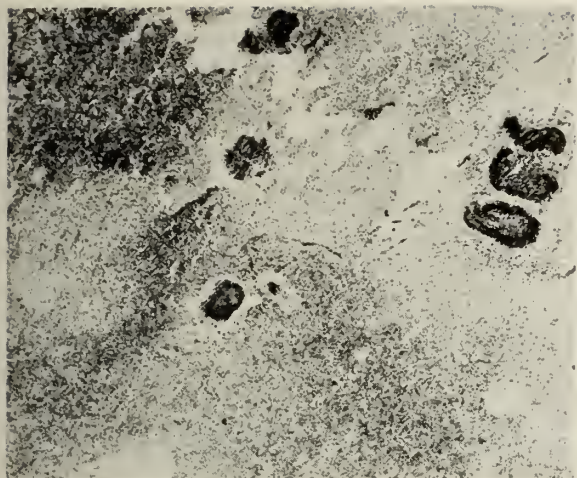


Fig. 1. Microscopic paraffin section of centrifuged pus, and stained with hematoxylin and eosin.

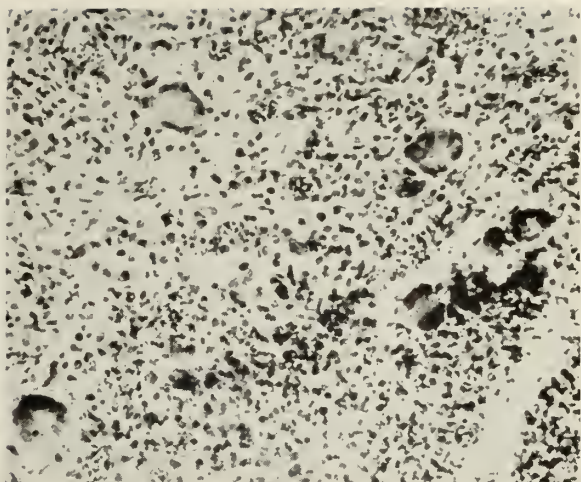


Fig. 2. Actinomycotic granulation tissue with numerous multinucleated giant cells.

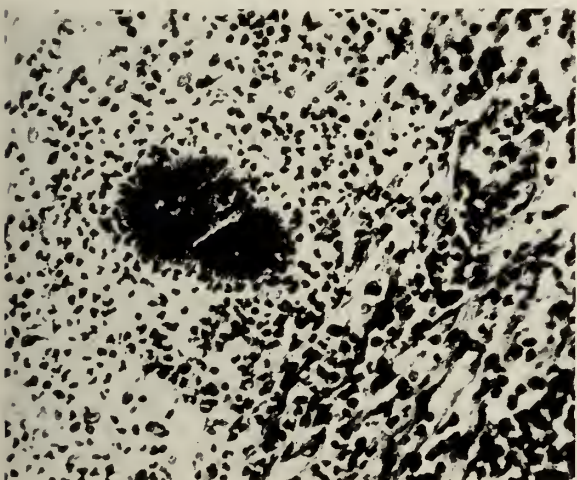


Fig. 3. A young colony and early granulation tissue reaction showing the characteristic zones.

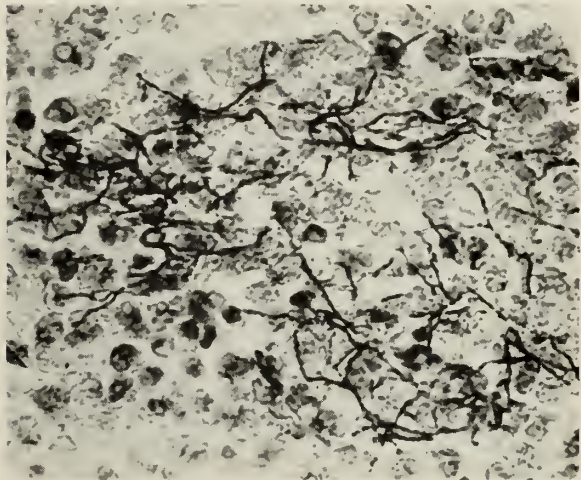


Fig. 4. Actinomycosis of the spleen. Note detached mycelial filaments surrounded by wandering cells.

and by this medium becomes capable of infecting man. This organism is an aerobe, very easily cultivated. It is not transferable to animals by inoculation.

The second theory was brought forth by Wolff and Israel, who described the organism as being a normal and constant inhabitant of the gastro-intestinal tract, which usually caused infection by passing through an abrasion in the mucous membrane. This organism is anaerobic, grows only at body heat and is rather difficult to cultivate.

Infection along the gastro-intestinal tract may be explained by ingestion, whether the fungus is normally present there or not; primary infections of the respiratory tract may be due to aspiration or to penetration of the esophagus by the organism. The greatest difficulty in tracing the course of infection is due to an inherent characteristic of this disease. The point of inoculation is quite frequently impossible to find, due to the fact that the initial lesion tends to heal. Probably one of the

most important predisposing factors for the implantation of the organism into the tissue is trauma.

In general, it may be said that the mouth is the most frequent portal of entry and localization of actinomycosis, while other portals of importance may be found in the lungs and intestines, and rarely in external lesions. From these foci, actinomycosis may actively invade every organ of the body by continuity or by the blood stream.

For the most part, the fungus diseases are not contagious. Direct transmission from animal to man has never been proved, and most of the attempts to convey the infection from human lesions to animals have been attended by failure.

GENERAL PATHOLOGY

One may define the disease as a granulomatous infection following a chronic but progressive course in which are produced small granules (sulphur bodies) containing the radiating filamentous structure with hyaline clubs at the periphery of the parasite. An acute and chronic



Fig. 5. Actinomycosis of the neck in a girl age thirteen.



Fig. 6. Rapid extension of the actinomycotic process during inadequate treatment.

infectious process may be seen progressing at the same time. A granuloma is produced which is tumor-like in character in that large nodules are produced. This granuloma consists of an acute and chronic type of granulation tissue, and more specifically is composed of pockets containing fungus colonies imbedded among polymorphonuclear and mononuclear cells surrounded by a rather vascular zone of epithelial cells, multinucleated giant cells, (Fig. 2), eosinophiles, and plasma cells. This zone in turn is bounded by dense and sometimes hyalinized fibro-connective tissue (Fig. 3). The vascularity of this granulation tissue is of a great importance from the standpoint of operative treatment. Along with the dense fibrous tissue reaction, there is a simultaneous degenerative process due to invasion of the connective tissue by

the fungus. The former is a tendency to walling off and healing, and the latter is an advancement by suppurating, degenerating and liquefying. When softening takes place, there is extensive lipoid degeneration with production of abscesses, cavities, and intercommunicating pus channels filled with purulent material containing yellow granules. Sinuses may form and discharge purulent exudate and inflammatory material. The healing process is characterized by the formation of large nodules of cellular fibrous tissue.

It is probable that extension takes place principally by the separation of the mycelia from the colony, picked up by wandering macrophages which carry them into neighboring tissue (Fig. 4). These strands may become broken off or detached from the original colony and produce a new colony. Thus the infection may spread directly into all the surrounding structures.

SPECIAL PATHOLOGY

The various tissues seem to respond in a fairly definite manner to actinomycotic organisms. The mucous surfaces of the body are rather resistant to the ray fungus. It is uncommon to find actinomycotic granulomas in mucous membrane; the organism tends to burrow away from such surfaces, and very often no trace can be found of the portal of entry in the mucosa. It is possible that the secretions in the oral cavity as well as in the gastrointestinal tract tend to prevent the growth of the organism. Although it appears that some tissues are more resistant than others, any tissue may be invaded and destroyed by this infectious process. In man, bone seems to be fairly resistant, but periostitis is seen not infrequently. The regional nodes may be hyperplastic, but it is certainly rare for extension to take place through this system. It frequently disregards fascial planes, but most of the growth takes place in the connective tissue. Cope and Goode state that there is a distinct integrity of the blood vessels in actinomycotic lesions. However, it has been found in the material at hand that there is frequently rather marked fibrosis in the vicinity of the larger vessels of an organ and not infrequently one finds a direct invasion into the largest vessels. A complete occlusion of the vena cava due to an actinomycotic thrombus has been noted.

CERVICOFACIAL FORM

The cervicofacial region is most often affected; most authors state that 60 per cent of the cases fall in this group. The upper jaw is rarely invaded, but the infection involves the gums, cheeks, teeth sockets, or the back of the mouth in the region of the molar teeth. The spread of the infection is away from the primary site toward the skin along the line of least resistance. Later localization takes place as a small indurated area at the angle of the jaw, or as a more extensive condition involving the cheek in the parotid region. The parotid-masseter actinomycosis is the most typical and common form. There may be extensive invasion of the tissues around the mandible, but rarely is there anything more than periosteal involvement, unless the infection starts about the socket of a diseased tooth. Submaxillary infection may occur as an infection along Wharton's duct,



Fig. 7. Actinomycosis of the head and neck of two years duration.



Fig. 8. One year after radical excision of the actinomycotic process. No recurrence.

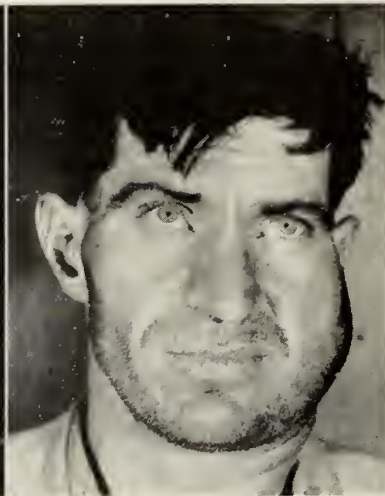


Fig. 9. Actinomycosis of the parotid-masseter region. Two months duration.

but the most common route is through the mucous membrane of the floor of the mouth. Low neck lesions may be due to direct extensions from the pharynx or trachea. There is generally little swelling on the inside of the cheek. As the lesions approach the skin during the course of softening and suppuration, numerous abscesses may occur in the involved tissues, and subsequently rupture through the skin to establish one or several draining points. The stage of induration may last several months. After drainage is established, the condition may subside and remain quiescent for a long time. Subsequently there may be more softening, abscess and sinus formation. According to Shiota, the acute features of this process depend, at least to some extent, on mixed infections.

From the parotid region, the process may extend into the temporal muscle, scalp, forehead, or to the back of the ear. If the course remains unaltered, the lesions in the neck tend to extend downward and sometimes backward. The muscles become infiltrated down to the base of the neck; direct extension into the mediastinum or the apex of the lung may follow. When the extension is backward, the vertebral column or base of the skull may become involved, and subsequently the meninges and spinal cord attacked. When the submaxillary region is involved, there may be involvement of the gland, a direct extension into the tongue, the ribbon muscles of the neck, and the submental region. The trachea is infrequently affected, even by secondary infiltration.

Patients first complain of a stiffness of the jaws, and later of an inability to open and close the mouth. Later swelling occurs which may or may not be painful. In some instances, patients consult dentists and frequently considerable oral sepsis and dental caries are found. Patients may complain early of trigeminal neuralgia. The induration may persist for some time before suppuration takes place. The most common errors in diagnosis are tuberculosis, malignancy, and dental root abscess, or cervical abscess, secondary to infected teeth,

After these lesions exist for awhile, there may be considerable cachexia and anemia with a low grade or hectic type of fever.

It has been said that primary actinomycosis of the tongue is quite rare; however, Shelmire has quite appropriately pointed out that the rare lingual localization of the disease in man is more apparent than real. At the onset, there is some induration and the patient may complain of slight or no pain, stiffness and swelling. As softening takes place and the lesion increases in size, there is more disability. If the lesion is not incised, an abscess forms which may rupture. Several sinuses may appear as extension takes place. Very rarely does a diffuse actinomycotic abscess of the tongue occur,¹⁵ but a diffuse multilocular abscess with numerous draining sinuses may form.⁴ From a lesion in the tongue, direct extension to adjacent tissues readily takes place.

TREATMENT

Of the various forms of treatment, surgery, radiation, and potassium iodide have proved to be the most valuable. Hyerdahl has reported good results with radiation therapy in actinomycosis of the head and neck, and prefers it in all types of actinomycosis to practical exclusion of all other therapy. Magnusson has shown that actinomycosis in cattle is usually due to the *Actinobacillus* and that massive doses of potassium iodide have been effectual, but have had very little effect on lesions caused by the *Actinomyces bovis*. Reynolds and Henrici have shown that iodides have no effect on actinomyces in vivo or in vitro. They obtained growth in media containing as much as 10 per cent potassium iodide. It was noted in several of the cases presented that, although the patients felt better physically, and the lesions did not seem to progress very much for a time, this manifestation was only temporary; the patients died from the disease. Therefore, it is doubtful that iodides exert any specific action on this parasite; and it is a question whether they stimulate fibrous tissue or not. It has not been possible to find any reported cases of complete

cure of proved actinomycosis by the use of potassium iodide alone, or of radiation therapy alone, although some apparent remissions have been demonstrated.

In attempting to eradicate the disease process, one must not rely on conservative methods, for as a whole they have proved to be failures. Surgical measures such as incision, excision, curettement, and drainage should have precedence over all other forms of therapy. It may not be necessary at first to do a complete extirpation of the disease process, as in cancer, since, in many instances promotion of adequate drainage alone may cure the disease. However, one must follow these cases quite closely, and if the disease does not clear up, more radical methods must be employed.

One should not, however, limit his treatment to one form of therapy, but should use every accepted approach to cure that is known. It seems advisable to follow surgery with potassium iodide and adequate doses of deep X-ray in some cases. Recently there have been reports on the use of sulfanilamide on these cases, but the follow-up time has been too short to make any definite conclusions as to its efficacy. In infections of the head and neck and tongue, surgery is preferred, viz., excision, if incision, curettement and drainage do not suffice.

SUMMARY

In the treatment of actinomycosis, if possible, complete eradication of the diseased process by certain surgical procedures should constitute the chief therapeutic measure. For supportive measures, potassium iodide and

irradiation therapy are of value, but they should be considered of secondary importance.

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The Prone Position for Gravity Drainage of the Abdomen

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THE idea of gravity drainage is not new. We know that it is the constant force of gravity which makes fluids seek the lowest possible level. How best to accomplish this in draining an abdomen is the problem.

Many years ago Fowler advocated the semi-sitting position, excellent in certain conditions but extremely fatiguing and occasionally injurious. In a hasty and no doubt incomplete review of the American literature on the subject, the earliest reference we were able to obtain was a paper by R. W. Harbin of Rome, Georgia, published in 1905 and entitled, "Ventral Decubitus as an Aid to Drainage for Diffuse Purulent Peritonitis," in which he observed that the value of postural gravity methods had "not been realized as fully as the merits of the procedure would warrant." In 1906 the late Robert C. Coffey of Portland, Oregon, writing on the subject, "The Principles and Mechanics of Abdominal

Drainage," said: "The two steps in the process of drainage are, first, bringing the fluid in contact with the drain; second, delivery of the fluid to the surface. Gravity performs the first step in all intraperitoneal drainage and, when postural methods are applicable, may also be made to perform the second." By the ingenious method of making a plaster cast of the abdominal cavity and cutting across this at various predetermined levels, Dr. Coffey was able to demonstrate the differences in depth of the various parts of the abdomen when the body was in supine position. He also showed that either of the flanks would contain more fluid than the pelvis and that to drain these fossae by use of the Fowler position required a 60 to 70 degree elevation of the body, whereas complete gravity drainage of all the abdominal cavities was obtained with the patient in a lateral position.

William Coughlin of St. Louis in 1912 made the following statement: "It is granted that intra-abdominal

pressure favors drainage of the abdomen, let the opening be where it will, but surely that pressure can work to better advantage if it does not have to overcome the influence of gravity." He carried out a series of experiments in which he filled the abdominal cavity of a horizontal body with 1000 cc. of water and measured the amount obtainable by drainage through different incisions with the body placed in various positions. He demonstrated that while the pelvic cavity could not be completely drained of water by raising the supine body even "bolt upright," it could be completely emptied by turning the horizontally placed body in a slightly prone position.

W. E. Leighton of St. Louis made the following statement in a paper published in 1914: "If gravity is the most important factor, then it would seem as if the ventral decubitus would be the logical position, since there are no pockets formed in this position. The incision is at the lowest point for affording a rapid evacuation of any abdominal fluid. The success in drainage of the peritoneal cavity must depend to a certain extent on the rapid removal of the exudate, otherwise the adhesions, which form about the drains . . . might wall off collections from the drainage tubes."

In a paper entitled "Posture in Abdominal Drainage," Roland Hill of St. Louis in 1916 made the statement: "The greatest factors in abdominal drainage are gravity, intra-abdominal pressure, and capillary attraction. Of these, undoubtedly the most important is gravity."

Further benefits of gravity drainage were brought out by E. P. Quain of Bismarck, who in 1928 stated: "The draining of an exudate from any cavity takes place most quickly and efficiently if the cavity is opened at the bottom. The advisability of opening an abscess at its lowest point was known in ancient times. This principle holds true also when it is desired to drain an infected peritoneum through an opening in the anterior abdominal wall. Our patients have made safer, quicker and more comfortable recoveries since we learned to place them in bed in such a posture that the open wound is at the lowest point of the abdominal cavity. . . . An additional benefit from the ventral posture comes from the fact that the stomach and duodenum have less difficulties with retention and regurgitation, and the patient will be tortured with the stomach tube less often."

Confirmation of the above conclusions is to be found in a report by the Drs. Harold Glascock of Raleigh, published in 1936.

In a paper presented before the Nebraska State Medical Association in May, 1937, I made the following statements: "There is one fact of which little or no mention has been made by earlier writers, perhaps because it is so evident; namely, the anatomical suspension of the abdominal viscera. Our forebears of ages past walked much as do the quadrupeds of today. The spinal column is the ridge-pole from which are suspended the viscera and little change has resulted in mankind despite many generations of bipedism.

"Of choice the child most frequently assumes the prone position for sleep and many adults likewise, unless acquired adiposity prevents. No doubt this is the position of choice because the individual has found it to be of greatest comfort. The dorsal or supine position is an acquired one, and possibly the result of soft mattresses and sagging springs. No quadruped assumes such position for sleep except the fat house-dog and then only occasionally.

"In the prone position the abdominal viscera hang from their attachments in orderly folds or loops, the circulation being unimpeded by the weight of bowel contents. We are told, by those who have made a study of the lymphatics, that the most free routes of absorption are through the diaphragm, the mesentery and the pelvis, and that there are relatively no lymphatic channels in the anterior abdominal wall. With the body prone, free drainage of toxic substance is away from the area through which they are most readily absorbed and toward that part through which absorption is least active."

As a part of this paper, my associates and I reported the results in a consecutive series of demonstrably perforated appendicitis, all patients being from my personal service. To bring this consecutive series up to date, we can report 161 such cases with 7 deaths, a mortality rate of 4.4 per cent, as compared with a rate of 8.9 per cent previous to the adoption of this method. Our use of the prone position for gravity drainage has not been limited to abscess or peritonitis from appendicitis but has been extended as a routine to all types of drained peritoneal infections and infections elsewhere in the body with most encouraging results. We acknowledge a debt of gratitude to a little girl who first gave us the idea by voluntarily assuming the prone position after operation and whose convalescence was uncomplicated and unusually rapid.

As we have endeavored to point out in some detail in former reports, there are other factors which doubtless contribute to comfort and recovery in all drainage cases, namely, gentle handling of tissues, the nondisturbance of surrounding viscera, the introduction of a minimum of non-irritating drain material, the avoidance of enemas or laxatives until convalescence is well established, the use of morphine in *small* doses and then only to alleviate pain, and, finally, the proper use of the prone position. In this respect, with patients who have had a spinal anesthetic, we use a small pillow placed with its lower margin just below the costal border to elevate or obliterate the upper abdominal fossae. For patients who have had a general anesthesia, the head of the bed may be elevated slightly. In obese patients the right lateral, slightly prone position may be the best obtainable.

It is our conviction that with the use of gravity or "non-stop" drainage, aided by minimum trauma before, during and after surgery, there is a more rapid elimination of toxins, less nausea and distentions, less wound infection, a lower mortality, and a more rapid recovery than is obtainable by any other method with which we are familiar.

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Educational Opportunities in Student Health Programs*

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THE opportunity to commune with others who are working for the welfare of college students is always stimulating and inspiring. We are a relatively small group and our work demands a certain amount of isolation from our confreres. It is all the more gratifying, therefore, to gather in this, our national meeting, for exchange of personal experiences and for counsel on our own college health problems. Our daily schedule of office and classroom work is heavy and at the end of the day we are inclined to think of accomplishments only in terms of having done something to help the students who have called upon us during the day. We become so engrossed in this fascinating and satisfying job that we often overlook some of the broader implications of student health work. It is my privilege to review some of our accomplishments and to point out particularly some of the educational opportunities offered to us in our everyday contacts with students. A sabbatical year has given me an unusual chance to study the educational opportunities of health service and health teaching. A study of student health problems for the American Youth Commission has impressed me with the fact that our work has contributed greatly and promises to contribute more to the advancement of medicine, particularly through the channel of health education. It is my desire to call your attention to some of these contributions and my hope to stimulate your interest in the educational opportunities of student health programs.

Student health programs usually began as teaching programs in the classroom or gymnasium. As these programs developed, the need for medical *service* grew more obvious and there has been an increasing emphasis on the student service function which we have come to call student health service. In many colleges this *service* aspect of student health work has come to dominate the

entire health program. It seems to me that we may predict a swing in the direction of education to the point where our programs maintain a better balance between health service and health education. We are all members of the faculty of educational institutions and our primary loyalties are educational. It is easy for those of us doing classroom teaching in hygiene to remember that we are "—one of a faculty assembled—," it should be easy for those of us working in the gymnasium to remember our educational opportunities, but it is often more difficult for the college physician working in a busy dispensary or infirmary to remember that he has teaching obligations. We should never forget that opportunities for instruction in matters of health permeate every activity of this student health program, whether for groups gathered in the classroom or on the gymnasium floor, or for ill individuals seen in the clinic or infirmary.

We are dealing with intelligent and educable young people whose knowledge of health and preventive medicine may or may not be equal to their knowledge of the classics, social or biological science, but our teaching opportunities in the area of hygiene are superior to those in other areas. Students may have indifferent interest in the classics or in biology but all students are interested in their own physical and mental well-being. Dr. Rogers¹ has remarked that ". . . the best teacher of hygiene is the master and not the servant of that body of tradition which passes for 'science' in his day." But this mastery of his medical science is not enough for the college physician. He must also master the many techniques of teaching. In short, he must interpret his scientific knowledge in a simple and practical way in order to make the most of his teaching opportunities. These opportunities are so unique that they merit the envy of the classroom teacher in other subjects. Our teaching is done by a combination of the classroom and clinic method whereby the learner is at once the object of the

*Presidential address, nineteenth annual meeting American Student Health Association, New York City, December 29, 1938.

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demonstration and the beneficiary of the method. What could be more ideal? How much simpler the teaching of mathematics would be if, each time the student learned a new equation he could be relieved of a distressing physical condition! How much simpler would be the English teacher's job if students consulted him with the same motives of personal concern and the same receptiveness to instruction as they have when they consult the college physician!

Osler has said that, "Medical progress will be made hand in hand with public information on medical subjects." This statement was never more true than today. There was a time when patients knew little concerning the nature and cause of their ills and depended implicitly upon the guidance of their physicians. People nowadays must be told the how and wherefore of their conditions and must know what medical science can do for them. The public no longer accepts medical science as something mysterious, nay, many people consider their own knowledge of their ills superior to the tenets of orthodox medicine. These changes in public information on disease processes and the growing emphasis on disease prevention require that the doctor be not only a competent clinician but also a competent teacher. This is true particularly of the college physician. Dr. Ray Lyman Wilbur² in his recent book *The March of Medicine* has said, "The doctor who guides normal people to continued good health will have to look at his patient from the standpoint of sound hygiene rather than as the receptacle of a disease that needs to be driven out." It happens that the physician's training of the past has been more concerned with ministration than with education. The techniques of ministration are still essential and might have been sufficient for the horse and buggy doctor, but contemporary lay medical knowledge requires the modern doctor to use also the techniques of education.

Health knowledge of the college student is naturally a lay knowledge, largely a reflection of the health information of his parents and whatever he has happened to learn in school. This usually consists of scattered facts of hygiene and a considerable amount of health misinformation. To fill in the gaps and to integrate sound health information, to correct faulty beliefs, to cultivate an interest in personal and community health problems and finally to help the student toward sound health attitudes; these are the tasks, yes, the opportunities of the college physician. Unfortunately, we college physicians find ourselves approaching this task with little educational equipment. We bring to the job a sound medical background, an ability to diagnose and treat, and a desire to instruct. Medical knowledge is essential, medical art is indispensable, but we must learn educational method. The fullest educational capabilities of the college physician are brought out when he has an opportunity to apply his skill and art in the matter of diagnosis, treatment and advice to the individual in the clinic or infirmary, an opportunity to observe the progress of educational research and an opportunity for classroom teaching.

EDUCATIONAL OPPORTUNITIES IN CLASSROOM TEACHING OF HYGIENE

It is fascinating to witness the emergence of public interest in matters of health and it is satisfying to realize that our opportunities for health education have increased in direct proportion to this growing interest. For many years this development was slow but recent trends in social consciousness of medicine and public health have stimulated the growth process. Francis Bacon found discouragingly few people interested in health in his time. He estimated that only one person in three thousand showed any interest in hygiene and as Rogers¹ has expressed it, most of these were "persons about to pass out of existence." Courses in hygiene have been taught in our colleges for many years. Rogers states that, "A hundred years ago all of the State teachers colleges and all of the colleges for women were doing what they could by way of furnishing instruction in health to their students." But very few colleges of other types were offering such instruction. Fifteen years ago Storey³ reported that 57 per cent of a group of state colleges and universities and a larger per cent of other types of colleges were carrying required courses in hygiene. In the American Youth Commission study⁴ (1935-36), we found that two-thirds of state colleges and universities, all teachers colleges and 80 per cent of privately endowed colleges were giving courses in hygiene. The number of courses offered in each college and the number of areas covered had increased appreciably since Storey's study. Apparently we are on the way toward the universal adoption of hygiene teaching in every college curriculum.

It is interesting to note the changing content in these courses. Early emphasis was largely upon matters of personal health and the general material covered was quite elementary. Modern courses stress the biological basis of personal hygiene and place more emphasis upon preventive medicine and community health problems. These courses are being developed in accordance with advances in educational research and the materials and methods are becoming more clearly defined. The two conferences on College Hygiene and the work of this Association's Committee on Informational Hygiene have had much to do with modern advances in hygiene teaching. But there is still much opportunity to prepare more detailed information in regard to content and method and to consider more careful evaluation of materials. These are tasks which the Committee on Informational Hygiene of this Association has set for itself.

Opportunities in classroom teaching are not limited to service courses for the general student body. Most colleges now are offering special courses for students in professional schools. Such courses have been recommended as part of the required curriculum in dental schools by the American Dental Association. They are being given in the majority of schools of nursing. More should be given in schools of theology. Storey reported that only seven out of one hundred such schools were giving hygiene courses. Rogers last year found that still only seven offered the subject. It is very encouraging

to note the increasing interest expressed by teachers in the lower schools in this subject of hygiene. It is encouraging also to note the increasing number of students being trained as hygiene teachers in our colleges. This increasing interest of teachers in the elementary and high schools is very gratifying to those who are hoping for the broader dissemination of information on matters of health. We may well anticipate that college students will come to us with a much broader foundation in health knowledge as a result of better teaching in the lower schools. This hope will be realized sooner if we as an association emphasize the importance of teacher training in hygiene and if we give support to the work of other organizations such as the American School Health Association and the American Association for Health, Physical Education and Recreation, a new department of the National Education Association.

In many colleges the classroom teaching program is being carried by physicians who are also carrying clinical responsibilities in the health service and infirmary. These individuals are well equipped with medical information and are completely absorbed in the welfare of students. Usually they have had little educational training, usually also they are doing fine educational jobs, though they would hesitate to admit it. Educational opportunities are best in colleges where these physicians are conducting both clinical and teaching assignments. This combination of duties works to the mutual benefit of both the clinic and classroom. The doctor brings to the classroom his clinical experiences and a practical knowledge of the needs of students who call upon him in his office. He returns to the clinic with methods of teaching that work to the advantage of ill students who come under his care. This reciprocal relationship should be cultivated. It brings both scientific integrity and animation into the classroom and it brings better educational method into clinic practice and to the bedside of ill students.

EDUCATIONAL OPPORTUNITIES IN HEALTH SERVICE

I doubt if many of our college physicians who work daily with the medical problems of students would consider themselves as teachers. Yet they could be teachers of the first order if their programs were fitted to the purpose. Individual instruction cannot be accomplished in a hasty interview. It is unfortunate that in some of our colleges the dispensary type of medical practice has come to dominate the health program. The organization of the physician's work and lack of assistance may result in "swamping" him with clinical problems. I am often reminded of Dr. Smiley's remark that "Nothing is more pitiful than to see one lone health service physician attempting complete medical care for a large student body." How many unequalled opportunities such a man is missing because he is denied time for leisurely counsel with his student patient. How much sound health instruction is denied his patient because his doctor has time to diagnose and prescribe but no time to prognose and describe. I am distressed on occasion when during a subsequent contact with a student I find that a more leisurely former interview and a few words of explana-

tion might have changed a faulty attitude or prevented an unfortunate medical situation.

At this point and in the way of seeking a solution to the problem of over-emphasis on student medical service, I am taking the liberty to quote from a letter sent by one of our most experienced representatives to a member of the Informational Hygiene Committee. It reads as follows: "It would be nice if I were wise enough to see any clear attack upon this very basic and important problem of hygiene instruction in colleges. I suppose there is no particular value in my giving vent to the opinion that we would be in a better position if colleges, over the years, had been devoting their energy to this problem rather than dissipating it on many forms of inadequate medical service to students."

In this same connection may I quote from the College Health Study of the American Youth Commission: "The quality of work in student health services is measured by diagnostic equipment sufficient to meet the needs of the local college situation and by a medical and nursing staff adequate to use this equipment as a means of protecting and instructing students in matters of health."

Educational opportunities in classroom hygiene are obvious but the opportunities for health instruction in the health service and infirmary have been assumed more than they have been described. It seems desirable, therefore, to point out a few of the occasions in health service work when the physician may serve in fine capacity as a teacher. The educational value of the college health examination has rarely been defined in terms of its health educational value to the student. It is unfortunate that these examinations are often conducted on a mass basis wherein the student rushes from one examiner to another, goes through various maneuvers and comes out with some information about his various pieces but little orientation as to how his "whole" has fared. There is little educational value in such a procedure unless the student is given a chance to learn something of its purpose and his outcome. In our zeal to find physical defects we may overlook the fact that the "normal" student deserves to learn that he is "normal." He deserves the assurance that he has no obvious defects or health handicaps. Thus the health examination can be made a fine educational instrument for students without significant defects. The best educational opportunities are presented in the health examination of a student with obvious physical defects. Such students deserve an explanation of the nature and severity of their troubles, their influence on present and future health, the probable cause and possible course. They should learn when and how the defect should be corrected, where to secure the appropriate medical care, the probable cost and the probable outcome of treatment. They should be guided in learning to live happily with defects that are not remediable. Are these not sound, indeed, essential, educational devices?

Interpretation of each item in the physical examination has its own specific educational value. As an example, we might consider the matter of deviation from

standard weight, indicating that appropriate weight is more dependent upon inheritance and body build than upon any prescribed standard. We might discuss vision defects in terms of their anatomical or physiological causes and psychological results. This might well lead into a discussion of the relative merits of people doing visual corrective work; the ophthalmologist versus the optometrist versus the optician versus the jeweler, etc.

I cannot resist the temptation to describe three items in the health examination which are particularly rich in educational values. A recent article on rheumatic heart disease by Hedley has impressed me with the educational implications of heart disease as we see it in student clinics. Most people have an innate fear of heart disease and college students are no exception. Much psychological damage is done in our health examination program when the medical examiner expresses special interest or concern in the discovery of a heart murmur. Records of heart murmurs should be written and not spoken. Our interpretation to the student must be prefaced by careful examination of the heart and of the student's personality and both must be considered in his instruction.

Health education should acclaim two recent outstanding victories and the same techniques involved in these victories should be used in the solution of other educational problems. Not many years ago tuberculosis was called the white plague, a disease of the slums, almost always fatal, a disease of sinister and galloping proportions. But thanks to the development of modern diagnostic and therapeutic methods, we have learned its means of attack and how it can be discovered in early stages. Furthermore, it has been possible to popularize these methods of early discovery. It has taken a number of years of educational effort to spread the news of modern case-finding, and we may state proudly that college health workers have taken a lead in this campaign. The work of the Tuberculosis Committee of this Association first under the chairmanship of Dr. Ferguson and now under Dr. Lyght has led to an ever clearer picture of tuberculosis in college students, but in addition it has stimulated student interest in the subject. Studies have revealed the incidence of the disease in college groups throughout the country but, more important, they have led to the early care of thousands of young people in college with active disease. The educational value of this program is evidenced by the number of students who come to our student health services daily asking for the tuberculin test. They are usually fully informed concerning the test and other techniques involved in diagnosis and therapy. Such progress is indeed a tribute to health education.

Until recently the words "syphilis" and "gonorrhea" appeared rarely except in the scientific articles. The stigma attached to these "social" diseases has been largely removed and for this we are grateful to the courageous work of the Surgeon-General, to the efforts of the Social Hygiene Association, to general public education and to college hygiene instruction. Sound, informative articles appearing in the lay press have led the way toward rational discussion of the subject. We have noted

the change in the student press. But most important we have noted increasing numbers of students reporting to our health services for serological tests either because of interest or exposure—but in either case—welcome. This is indeed a victory for health education.

The educational opportunities presented by our contacts with students in the student clinic and infirmary cannot be overemphasized. A student visit to the clinic or a doctor's call on an ill student in the infirmary may often be the occasion for discussion of health matters which carry the student far beyond classroom lectures on the subject. Diehl⁶ has said, ". . . the most effective health instruction that we do is at the time when students come to us for medical advice, medical care or health examination. It is natural for college students, like the rest of us to be most acutely interested in health when there is a possibility of losing it." It is the old motto, used many times in other educational circles and coming to light again in the Progressive Education movement, "Strike while the iron is hot." A student has unusual opportunities to court instruction during a visit with the college physician, whether the purpose of his call be for diagnosis or treatment of a specific ailment or for medical advice on some general problem, or because of some difficulty with the administration or some emotional trouble. In the doctor's office or infirmary the student is exposed to other situations which have distinct educational value. He should learn the methods of a well-equipped physician working in a "model" office. He should learn something of the doctor's problems of diagnosis and therapy, he should learn what to expect of medical procedures and the value to him of seeking early medical attention. He should learn something about the use and abuse of drugs, and should learn to interpret medical articles and advertisements. He should learn how to discriminate between sound and unsound medical practice. We hope he learns the old adage that "He who is his own doctor has a fool for a patient."

You will note that I have spent much time in emphasizing the health service and infirmary as educational laboratories. I do not mean to create the impression thereby that their purpose is solely educational. They exist primarily for student service and as the college's agency to protect student health. We are all aware of their indispensable value as such. Without health service the student health program of many colleges would be deprived of a primary purpose, but if health service fails to carry its instructional obligations, then college health education will be robbed of a primary opportunity.

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SURGERY IN THE NORTHWEST

This sixty-ninth anniversary issue of THE JOURNAL-LANCET is devoted to "Surgery". It carries thirteen original papers on a wide variety of surgical topics, ranging from "Actinomyces of the Neck" to "Penetrating Wounds of the Knee-joint." In one respect, this issue is unique in the annals of medical literature. Every original paper comes from a surgeon who is actively practicing in North Dakota, South Dakota or Montana.

The publication, for the first time, in one special issue of a single journal, of a group of fine and progressive surgical papers from a section of the country which should have a wider reputation as a medical center, is fraught with significance. It is in the first place evidence stronger than propaganda of the high quality of medical service actually available to the people of the United States even in a part of the country where the density of population is less than five people per square mile.

Secondly, it is testimony to the surgical skill and judgment of men who are practicing progressive and intelligent surgery in a part of the United States which many people still consider the "great open spaces." We are reminded that the skill of a surgeon is in no way related to the size of the community in which he practices. This lesson has been brought home to the American public in the recent and justly popular book, "The Horse and Buggy Doctor," by Arthur Hertzler, M.D., of Halstead,

Kansas. The active courage of American pioneers must remain part of the mental equipment of every successfully practicing surgeon.

Finally, this issue of THE JOURNAL-LANCET may stand as proof to more populous sections of the United States that men in the lesser known towns in the great Northwest have practical contributions to make to the surgical progress of the world.

We do not believe in any such nonsense as "regional surgery." The art of healing knows no state lines nor national boundaries. The fellowship of surgery is worldwide. It is worth noting, however, that the practicing surgeons of the Dakotas and Montana can teach as well as learn from others. The three states from which we have drawn our contributions to this issue were once included in what was known as the "Dakota Territory." There is significance in the name. It is derived from a Sioux Indian word "koda", of the Santee dialect, meaning an "alliance of friends." Such indeed is the philosophy that underlies the art of surgery.

We are proud to present to their colleagues in the "Flickertail" (North Dakota), "Coyote" (South Dakota), and "Bonanza" (Montana) states the contributions to surgical literature of men who are practicing among them. We are also pleased to be able to bring concrete evidence of these contributors to the rest of the United States.

R. C. W.

THEN AND NOW

Sixty-nine years ago teachers of surgery were content to explain the cause and advent of inflammation in the high-sounding but now meaningless terms: *ubi irritatio, ibi fluxus; ubi fluxus, ibi stasis; ubi stasis, ibi inflammatio*. Four mystical words were memorized as the classical signs of a local inflammation—*calor, rubor, tumor, dolor*. Pyogenic organisms were not known, but it was a well-established observation that an abundance of thick pus in a wound was a more encouraging sign than the thin exudate now known to be due to streptococci. It was therefore called laudable pus.

We shudder when told how the great Bigelow of Harvard used to keep a pus- and blood-bespattered Prince Albert coat at the hospital for wear in the operating room. It has been questioned whether an assassin or an instrument, in the hands of the great Agnew, probing the bullet-sterilized wound, was the cause of President Garfield's death. But this was before our present knowledge of infections. The microscope, radiology, and refinements in anesthesia have all contributed to make modern surgery what it is.

The red blood corpuscles were discovered by van Leeuwenhoek, yet little was known about the role of the leucocytes before Ehrlich and Metchnikoff announced their works on immunity. The former promulgated the side-chain theory, and the latter rested his case on pure leucocytosis. With the advent of bacteriology and a clearer understanding of the mechanism of disease resistance, inflammation was placed upon its present scientific basis. Antiseptic and aseptic techniques were born.

Osler gave a reception for Keen at the Baltimore Club in February, 1905. Keen spoke to the assembled guests on the changes that had taken place in surgery during his 50 years of practice. His climax came with these words: "As I look upon you young men, I am reminded of what Paul said to the centurion when he was cast into prison, 'Dost thou imprison a Roman without trial?'"

"The centurion asked, 'Art thou a Roman?'"

"Paul replied, 'Yea, I am a Roman born.'"

"The centurion responded, 'At a great price obtained I that freedom.' " (Roman citizenship at that time could be purchased.)

"As I look upon you young men who live in this age of enlightenment, I am compelled to say that you are Romans born. At a great price obtained I that freedom."

A. E. H.

SIXTY-NINE YEARS

When one scans the thousands of pages of a file of the *JOURNAL-LANCET* for the past 69 years, he appreciates the role of the medical journal in keeping the medical profession abreast of the times. The *JOURNAL-LANCET* is only one of many medical journals which has always had the same high aims. In the pages of all these journals war has constantly been waged against disease.

Everywhere, the members of the medical profession have kept informed through medical journals and they have applied their knowledge with astounding results.

Cholera infantum, diphtheria, typhoid fever and small-pox have been reduced to negligible proportions. Tuberculosis has been definitely reduced. Maternal and infant mortality have been markedly decreased. Numerous disease conditions of all parts of the body have been defeated by the surgeon. All of this has been largely responsible for increasing the span of life in the United States—from approximately forty years at the time of the Civil War to approximately sixty years at present—two thousand more years of living for each one hundred girls and boys, and living that is more enjoyable than ever before because of the decrease in distress and discomfort.

The medical profession has seen to it that the health of our poor citizens as well as that of the well-to-do and intermediate groups has been guarded. It has been estimated that in the United States alone, the members of the medical profession donate one million dollars worth of service daily in order that the needy may have adequate medical service. It has long since been expressed that the health of the people is the greatest asset of any nation. The high standing of the United States among the nations of the world is due in no small part to the accomplishments and services of the medical profession. One can scarcely pick up a newspaper or a popular magazine today without finding statements concerning the medical profession; some are appreciative while others are extremely critical. Such criticism is always present during times of financial stress even though the medical profession is in no way responsible for existing conditions. Despite comment and controversy, notwithstanding turbulence and argument, one fact stands steady and immutable—that through the years medical progress will continue. The scientific urge and the desire to aid the suffering is constant. Experiments will be performed, conclusions drawn and discoveries recorded.

One of the most valuable services that can be performed in the field of medicine is the maintenance of impartial journals for recording scientific opinion and practice. Such journals make a contribution to the generations in which they have their being. They offer a medium for the transmission of ideas and a forum for the discussion of procedure. No matter how many conflicting groups meet for parley, regardless what steps may be taken to socialize medicine, to revamp the national health structure, to induce special legislation or to "level off" medical activities, there will always be a continuous effort on the part of the profession to move forward in the prolongation of human life and on the part of professional medical journals, worthy of the name, an effort to spread the facts of this effort conscientiously and widely. On this sixty-ninth anniversary of the *JOURNAL-LANCET*, its Editorial Board and publishers pay tribute to those great physicians and publishers of previous years and decades, who perpetuated the journal and made it so worth while, and they now pledge themselves to continue these activities so as to make each succeeding volume of even more service to the medical profession and the good health of the public than the last.

J. A. M.

THE NORTH DAKOTA MEDICAL PRACTICE ACT

Several years ago, in order to make more effective that part of a law providing fines and imprisonments for impersonating a regular physician, a bill was introduced into the state legislature aiming to increase such fines and imprisonments for second and later violations. The bill was vetoed on the ground that it aimed at creating a medical monopoly, despite the fact that victims of irregulars had appealed on different occasions to the State Board for help to incarcerate the irregular "practitioners". One advertiser especially led the Board a merry race, without anything worth while being secured, until finally the Federal Government came into the scene; the man is now safely lodged for the next several years.

The North Dakota medical profession hope that

during the current session of the legislature a suitable bill may be passed.

For comparison between the limited authority placed with the State Medical Board, as against heavier police powers permitted to some very subordinate, so-called *professions*, note the following North Dakota January, 1939, advertisement, from which some humor can well be developed:

"WARNING HAIRDRESSERS: The law fixes a penalty of One Hundred Dollars (\$100.00) fine or ninety (90) days in jail or both for practicing hairdressing and beauty culture without a license. Acceptance of tips or other compensation by an unlicensed operator constitutes a violation. Persons knowing of violations, please notify the State Board of Hairdressers, 102 Bdway., Fargo, N. Dak."

A. W. S.

Book Reviews

The Treatment of Fractures, by CHARLES LOCKE SCUDDER, A.B., Ph.B., M.D., F.A.C.S.; 11th edition, revised with 1717 illustrations, 1208 pages; Philadelphia: W. B. Saunders Co.: 1938. Price, \$12.00.

It has been twelve years since the publication of the previous edition of Dr. SCUDDER's notable work on fractures, and this edition has been completely revised. One-third of the material presented in this book, covering special fracture problems, has been written by twenty other men actively engaged in the work of which they write. Fifteen of these contributors are from Boston. In reviewing this book, one is impressed with the influence of Dr. SCUDDER's many years of experience as Chairman of the Committee on the Treatment of Fractures of the American College of Surgeons and the wide contacts which resulted from this position. The book is by no means provincial but is rather national in character. All of the various classes of fractures have been covered in as thorough a manner as space permitted, and modern approved methods of treatment have been described. Like many other textbooks on fractures, there was insufficient space devoted to fractures of the upper end of the tibia involving the knee joint. The special chapters on first aid and transportation, extension, skeletal traction, fractures of the vertebrae, surgical approaches to the bones, injuries to the intervertebral disks and methods of recording functional results are but a few of the many valuable features of this edition. There is a very useful chapter on the use of the fluoroscope. A chapter on surgical directions for the X-ray technician should, however, be included in every modern fracture text. One is impressed by the up-to-date, youthful and aggressive appearance of this book, first published in 1900 and now in its 11th edition.

Genital Abnormalities, Hermaphroditism, and Related Adrenal Diseases, by HUGH HAMPTON YOUNG, M.A., M.D., Sc.D., F.R.C.S.I., D.S.M., Professor of Urology, Johns Hopkins University; 649 pages; Baltimore: Williams & Wilkins Co.

From his wide urological experience, Dr. YOUNG has collected the results of comprehensive studies in the field of genital and adrenal abnormalities. This book is a fascinating presentation of a variety of genital malformations, with detailed descriptions of their embryologic development and the surgical procedures used in their correction. A complete survey of hermaphroditism is included, beginning with an interesting discussion of its historical aspects in the ancient literature and art. A chapter is devoted to prostate in females, the congenital malformation to

which the author has directed much attention. In addition to his study of the adrenal-genital relationships, there is an accurate description of the writer's methods and procedures in adrenal surgery.

The entire volume is interesting reading for every practitioner and student, presenting many of the author's personal experiences in treatment of these unique genital and adrenal disorders. It is profusely illustrated by photographs, photomicrographs, and many of W.M. P. DIDUSCH's excellent drawings to emphasize Dr. YOUNG's own procedures.

Management of the Sick Infant and Child, by LANGLEY PORTER, B.S., M.D., M.R.C.S. (Eng.), L.R.C.P. (Lond.), Dean, University of California Medical School and Professor of Medicine; and WILLIAM E. CARTER, M.D., Director, University of California Hospital Out-Patient Department; revised 5th edition, 874 pages; St. Louis: C. V. Mosby Co.: 1938. Price, \$10.00.

This book presents the current accepted methods of treatment for most of the disturbances of infancy and childhood. One part is devoted to the management of symptoms, another to the actual disease entities, and the third to various therapeutic procedures. There is a wealth of information in every aspect of pediatrics carefully evaluated in terms of actual clinical experience. But apparently the findings of the pediatricians of the West are favored. A unique departure from most textbooks is the chapter on Behavior with pertinent conclusions for everyday practice.

Clinical Laboratory Methods and Diagnosis, Textbook on Laboratory Procedures with Their Interpretations, by R. B. H. GRADWOHL, M.D., director of the Gradwohl Laboratories; 2nd edition, 492 illustrations in the text and 44 color plates; St. Louis: C. V. Mosby Co.: 1938.

The first edition of *Clinical Laboratory Methods and Diagnosis* met with such a fine reception at the hands of reviewers and readers that it seemed necessary to revise this edition. The aim of the second edition of this volume is to eliminate the errors that appeared in the former edition and to delete any obsolete or impractical methods. Newer technics have been described and the literature has been brought up to date. Newer concepts of nephritis and nephrosis have been discussed in detail and the chapter on blood chemistry has been amplified and simplified. Whenever possible, standard modern methods are adopted and older or impractical methods are discarded. The chapter on symptomatology has been enlarged by over 100 pages and 24 full-page color plates have been added. The second edition of this volume can truly be looked upon as a veritable atlas of hematology. There is no doubt in the mind of the reviewer that the second edition of *Clinical Laboratory Methods and Diagnosis* should receive even a more extensive reception than that given the first edition.

Proceedings of the
Nineteenth Annual Meeting
of the
AMERICAN STUDENT HEALTH ASSOCIATION

Hotel New Yorker, New York City

December 29-30, 1938

Business Session

OFFICERS—1939

President—Dr. Charles E. Shepard
Vice-President—Dr. W. H. York
Secretary-Treasurer—Dr. Ruth E. Boynton

Council

Dr. R. W. Bradshaw	Dr. D. F. Smiley
Dr. John Sundwall	Dr. E. Lee Shrader
Dr. J. E. Raycroft	Dr. Lee H. Ferguson
Dr. J. E. P. Holland	Dr. H. L. Marshall
Dr. T. A. Storey	Dr. G. T. Wilhelm
Dr. H. S. Diehl	Dr. Ruth M. Collings
Dr. J. F. Edwards	Dr. H. N. Kingsford
Dr. W. E. Forsythe	Dr. Dan G. Stine

Executive Committee

Dr. Charles E. Shepard	Dr. Ruth E. Boynton
Dr. W. H. York	Dr. R. W. Bradshaw

Dr. E. Lee Shrader

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Dr. A. V. Bock	Dr. Dorothea Scoville

Departmental Organization and Administration

Chairman, Dr. M. W. Husband

Dr. Irvin W. Sander	Dr. F. R. Whittlesley
	Dr. J. G. Grant

Informational Hygiene

Chairman, Prof. T. Bruce Kirkpatrick

Prof. E. F. Van Buskirk	Prof. C. E. Turner
Dr. Howard Beard	Dr. Warren E. Forsythe
Dr. Mary de Kruif	Dr. Frances Scott
Dr. A. G. Gould	Dr. Amelia Wood

Hygiene of Physical Activities

Chairman, Dr. L. B. Chenoweth

Dr. Margaret Bell	Dr. John M. McCleery
	Dr. James Oberlander

Health Problems of College Women

Chairman, Dr. Ruth Fairbank

Dr. Marjorie Smith	Dr. Jessie Herrick
	Dr. Helen Pryor

Editorial Committee

Dr. E. Lee Shrader	(3)*	Dr. Ruby Cunningham	(1)
		Dr. Ruth E. Boynton	(1)

Tuberculosis Committee

Dr. Charles E. Lyght	(3)	Dr. R. H. Stiehm	(1)
Dr. J. A. Myers	(3)	Dr. E. Lee Ferguson	(1)
Dr. H. D. Lees	(3)	Dr. Anna Richardson	(1)

Local Sections

Dr. D. F. Smiley	(3)	Dr. Lee W. Milford	(1)
Dr. T. A. Storey	(3)	Dr. J. G. Grant	(1)

Eye Health

Dr. R. W. Bradshaw	(3)	Dr. Lee H. Ferguson	(1)
Dr. L. M. Hickernell	(3)	Dr. Ruby Cunningham	(1)

Mental Hygiene

Dr. T. Raphael	(3)	Dr. H. D. Palmer	(1)
Dr. E. M. deBerry	(3)	Dr. W. H. York	(1)

Training Personnel

Dr. W. E. Forsythe	(3)	Dr. K. Frances Scott	(1)
		Dr. H. L. Marshall	(1)

* The number in parenthesis indicates the duration of appointment.

THURSDAY, DECEMBER 29

Session I

9:00 a. m.—Registration.

9:30 a. m.—Call to Order.

Secretary's Report—Dr. Ruth E. Boynton.

Reports of Local Sections—

Chairman, Dr. D. F. Smiley, Cornell University.

Report of Eye Health Committee—

Chairman, Dr. R. W. Bradshaw, Oberlin College.

Appointment of Nominating Committee.

Session II

10:30 to 12:00—General Session.

A. Committee on Health Service. *Chairman*, Dr. Ralph I. Canuteson, University of Kansas.

The Clinical Significance of Glycosuria—Dr. B. A. Watson, University of Minnesota.

Discussion opened by Dr. D. F. Smiley and Dr. A. B. Light.

B. Committee on Informational Hygiene. *Chairman*, Prof. T. B. Kirkpatrick, Columbia University.

Tentative Reports and Recommendations of the Committee.

C. Committee on Organization and Administration. *Chairman*, Dr. Helen B. Pryor, Stanford University.

An Evaluation of Health Service Procedures—Dr. W. E. Forsythe, University of Michigan.

Association Luncheon—12:30

President's Address—"Educational Opportunities in Student Health Programs." Dr. Charles E. Shepard, Stanford University.

Session III

(For purposes of round table discussions in Session III, the representatives gathered into six general groups, according to the type of institution they represent.)

2:00 to 3:30—Round Table Sessions.

Committee on Health Service. *Chairman*, Dr. Ralph I. Canuteson, University of Kansas.

Round Table No. I. Representatives from all state-supported and large endowed co-educational colleges and universities. *Sub-chairman*, Dr. H. D. Lees, University of Pennsylvania.

Round Table No. II. Representatives from all small endowed co-educational colleges and universities. *Sub-chairman*, Dr. J. Wilbur Armstrong, Berea College.

Round Table No. III. Representatives from Women's Colleges. *Sub-chairman*, Dr. Ruth M. Collings, Woman's College of North Carolina.

Round Table No. IV. Representatives from Men's Colleges. *Sub-chairman*, Dr. W. H. York, Princeton University.

Round Table No. V. Representatives from municipal colleges and universities having almost exclusive day school enrollments. *Sub-chairman*, Dr. Irvin W. Sander, Wayne University.

- Round Table No. VI. Representatives from Teachers Colleges. *Sub-chairman*, Dr. A. O. DeWeese, Kent State University.
- 3:30 to 5:00—Round Table Sessions.
Committee on Organization and Administration. *Chairman*, Dr. Helen B. Pryor, Stanford University.
- Round Table I. Representatives from all state-supported and large endowed co-educational colleges and universities. *Sub-chairman*, Dr. Ruby Cunningham, University of California.
- Round Table No. II. Representatives from all small endowed co-educational colleges and universities. *Sub-chairman*, Dr. George T. Blydenburgh, Ohio Wesleyan University.
- Round Table No. III. Representatives from Women's Colleges. *Sub-chairman*, Dr. Grace Hiller, Goucher College.
- Round Table No. IV. Representatives from Men's Colleges. *Sub-chairman*, Dr. J. P. Ritenour, Pennsylvania State College.
- Round Table No. V. Representatives from municipal colleges and universities having almost exclusive day school enrollments. *Sub-chairman*, Dr. F. A. Woll, College of the City of New York.
- Round Table No. VI. Representatives from Teachers Colleges. *Sub-chairman*, Dr. Glenadine Snow, Michigan State Normal College.
- 6:30 p. m.—1938 Council Dinner.

FRIDAY, DECEMBER 30

Session IV

- 9:00 to 10:30—Round Table Sessions (A and B ran concurrently).
- A. Committee on Health Service. *Chairman*, Dr. Ralph I. Canuteson, University of Kansas. *Discussion leaders*: Drs. Lees, Armstrong, Collings, York, Sander, DeWeese.
- B. Committee on Informational Hygiene. *Chairman*, Prof. T. B. Kirkpatrick, Columbia University. *Discussion leaders*: Drs. Forsythe, DeKruif, Gould, Scott, Turner, Wood.

Session V

- 10:30 to 12:00—Round Table Sessions (C and D ran concurrently).
- C. Committee on Organization and Administration. *Chairman*, Dr. Helen B. Pryor, Stanford University. *Discussion leaders*: Drs. Cunningham, Blydenburgh, Hiller, Ritenour, Woll, Snow.
- D. Committee on Hygiene of Physical Education Activities. *Chairman*, Dr. Thomas A. Storey, Stanford University. *Discussion leaders*: Drs. Chenoweth, Howe, Kler, York.
- 12:00 to 1:00—Business Meeting.
Report of Council Meetings.
Report of Nominating Committee.
Report of Tuberculosis Committee.
Chairman, Dr. Charles E. Lyght, Carleton College.

1:00 p. m.—Council Luncheon.

Session VI

- 2:30 to 4:30—General Session.
- A. Committee on Hygiene of Physical Education Activities. *Chairman*, Dr. Thomas A. Storey, Stanford University.
The Hygiene of Physical Activities, Dr. Thomas A. Storey.
Discussion opened by Drs. York, Chenoweth, Howe, Kler.
- B. Committee on Mental Hygiene. *Chairman*, Dr. Theophile Raphael, University of Michigan.
Mental Hygiene, Dr. Robert M. Fleming, Harvard University.
- C. Committee on Eye Health. *Chairman*, Dr. R. W. Bradshaw, Oberlin College.
Eye Health of College Students, Dr. Anette M. Phelan.
Discussion opened by Dr. LeGrand Hardy.

- D. Committee on Health Service. *Chairman*, Dr. Ralph I. Canuteson, University of Kansas.
Incidence of Syphilis, Dr. R. A. Vondelehr, U. S. P. H. S.
Discussion opened by Dr. Harry Eagle, U. S. P. H. S. and Dr. Ruth E. Boynton, University of Minnesota.
- Reports of Chairmen of Round Tables (10 minutes).
1. Health Service, Dr. Ralph I. Canuteson.
 2. Informational Hygiene, Prof. T. B. Kirkpatrick.
 3. Organization and Administration, Dr. Helen B. Pryor.

FINANCIAL STATEMENT

December 31, 1938

Receipts	
Balance brought forward	\$1,560.85
1938 dues from 154 members	1,540.00
1936 dues from 1 member	10.00
1937 dues from 2 members	20.00
1939 dues from 8 members	80.00
Proceedings sold—36 at \$1.75	63.00
	\$3,273.85
Disbursements	
Subscriptions to JOURNAL-LANCET (159) ..	\$238.50
Postage, Secretary's office	\$70.00
Postage, Dr. Lyght's Committee	20.00
	90.00
Honararium to Father Schwitalla	20.00
151 copies of Proceedings of Second National Conference on College Hygiene ..	75.50
500 Reprints of Father Schwitalla's address	19.50
Dr. Smiley's expenses to National Health Education Meeting	19.10
Secretarial Help	50.00
Exchange	4.20
Refunds to Sections:	
Indiana	\$10.00
Mid-Atlantic	35.00
Michigan	22.50
New York	42.50
North Central	30.00
Pacific Coast (NW)	15.00
Ohio	35.00
Pennsylvania-New Jersey	45.00
Rocky Mountain	7.50
Southern	17.50
South Central	25.00
Southwestern	17.50
	302.50
Stationery and printing, 1938:	
Letter heads, envelopes, programs	47.15
1937 Proceedings:	
375 copies	\$361.25
Boxes and labels	41.00
Postage and express	21.63
	423.88
Convention expense:	
Council dinner and luncheon	\$59.33
Tips, tax, telephone	16.64
Rental of projector	8.00
Travel expense, Secretary	92.55
	176.52
Balance	\$1,466.85
	1,807.00
	\$3,273.85

RUTH E. BOYNTON, M.D.,
Secretary-Treasurer.

BUSINESS MEETING**Thursday, December 29, 1938****Report of the Secretary-Treasurer**

The following report of the Council Meeting of December 31, 1937, was read and approved:

Mr. L. M. Cohen, manager of the *JOURNAL-LANCET*, was a guest of the Council for luncheon. At the request of Mr. Cohen, it was moved by Dr. Smiley and seconded by Dr. Forsythe that the Association make a three-year agreement with the *JOURNAL-LANCET* to continue this journal as the official magazine of the Association. Mr. Cohen stated that if at any time during this period, for any reason, the Association wished to discontinue this agreement with the *JOURNAL-LANCET*, that could be done.

It was moved by Dr. Ferguson and seconded by Dr. York that some of the detailed material on tuberculosis in colleges, which was presented before the Second Conference on College Hygiene but not included in the Proceedings of the Conference, be published. How this material should be distributed was referred to the Executive Committee. This motion was passed.

It was moved by Dr. Smiley and seconded by Dr. Canuteson that the President appoint a special committee to study the needs and possibilities of training student health workers, and also the possibilities for establishing exchange positions for people in student health work. Motion was passed.

It was moved by Dr. York and seconded by Dr. Bradshaw that the 1938 meeting be held in New York City.

The idea of establishing a special research committee in the Association was brought up by Dr. Cunningham and discussed by the Council. It was felt by several members of the Council that a special research committee at this time was not necessary. It was suggested by Dr. Smiley that the Editorial Committee might act in the capacity of a research committee. It was moved by Dr. Cunningham and seconded by Dr. York that this suggestion that the Editorial Committee act for this Research Committee, be carried out. Motion was passed.

The Secretary reported that there are a total of 148 member institutions in the Association, 145 of which have paid their annual dues. Applications for membership have been received from 18 institutions during the past year. During the year Battle Creek College, Battle Creek, Michigan, closed for an indefinite period and therefore withdrew from our Association.

Copies of the Proceedings of the National Conference on College Hygiene were sent to all member institutions. Reprints of the luncheon address given by Father Schwitalla at the 1937 meeting were mailed to all member institutions and to the officers of all of the local sections.

An honorarium of \$20.00 was sent Father Schwitalla on vote of the Executive Committee.

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee, consisting of Dr. Ralph I. Canuteson, Dr. George T. Blydenburgh, and Dr. Fred Miller, presented the following ballot for officers of the Association for 1939:

President: Dr. Charles E. Shepard, Stanford University, Palo Alto, California.

Vice-President: Dr. W. H. York, Princeton University, Princeton, New Jersey.

Secretary-Treasurer: Dr. Ruth E. Boynton, University of Minnesota, Minneapolis, Minnesota.

Members of the Council for two year terms, expiring December, 1940: Dr. Ruth Collings, Woman's College of North Carolina, Greensboro, North Carolina; Dr. H. N. Kingsford, Dartmouth College, Hanover, New Hampshire; and Dr. Dan G. Stine, University of Missouri, Columbia, Missouri.

This report was accepted and the secretary instructed to cast an unanimous ballot for these officers.

BUSINESS MEETING**Friday, December 30, 1938****Report of Council Meeting:**

The following report and recommendations of the Advisory Council Meeting of Thursday, December 29, 1938, were received and approved:

The Council discussed the admission of junior colleges to membership in the Association. It was the opinion, after much discussion, that junior colleges should be admitted to the Association, as any other college may be after each college has been considered individually.

A suggestion made by Dr. Dan Stine, University of Missouri, that the American Student Health Association consider urging approval of student health services for certification of residence physicians was discussed. It was the opinion of the Council that, since the type of health services vary so greatly, it would be unwise for the Association to take any action on this question. It was felt that individual student health services might take the initiative for their particular schools if they so wished.

The question of the American Student Health Association publishing its own Journal was discussed. The suggestion was made with the idea that many papers presented at local sections were worthy of publication. It was pointed out that the *JOURNAL-LANCET* is glad to publish as many papers as the Association presents, so that papers from local sections may be published in the *JOURNAL-LANCET*. During the discussion it was brought out that publication of a separate Journal would be very much more expensive than using the *JOURNAL-LANCET*, and also obviously would require much more time on the part of some member of the Association. The Council voted that the Secretary write a letter to the local sections requesting them to send outstanding papers to the Editorial Committee of the American Student Health Association for consideration for the *JOURNAL-LANCET*.

Dr. Smiley reported on the meeting of the Health Education Conference in New York, December 4 to 7. Dr. Charles E. Shepard asked Dr. Smiley to represent the American Student Health Association at this conference. It was moved by Dr. Ferguson and seconded by Dr. Storey that Dr. Smiley's expenses of \$19.10 be paid by the Association. Motion was carried.

Dr. Charles Shepard commented on the recent celebration at the University of Michigan of the twenty-fifth anniversary of the establishment of the Student Health Service. The Executive Council voted to commend the leadership of the University of Michigan in the development and progress in student health work.

The Council voted to ask members of the Association to participate in the observance of National Social Hygiene Day on February 1, 1939.

The Secretary read a letter from the American Council on Education inviting the Association to join the American Council on Education as an associate member. The annual membership fee is \$10.00. After some discussion, during which it was pointed out that the American Council on Education has been interested in furthering knowledge on student health work through the American Youth Commission, it was moved by Dr. Smiley and seconded by Dr. Bradshaw that an associate membership in the American Council on Education be taken for one year.

The Council recommended that membership be granted the following institutions:

Colby Jr. College for Women, New London, N. H., Dr. William P. Clough, Miss Viola G. Pfrommer.

Idaho, University of, Moscow, Ida., Dr. Harold D. Cramer.

Illinois, University of, Urbana, Ill., Dr. J. Howard Beard.

Knox College, Galesburg, Ill., Dr. B. D. Roberts.

Long Island College of Medicine, 350 Henry St., Brooklyn, N. Y., Dr. M. B. Handelsman.

Loyola University, 706 S. Lincoln, Chicago, Ill., Dr. Robert E. Lee.

Medical College of Virginia, Richmond, Va., Dr. Fred J. Wampler.

Northwestern University, Evanston, Ill., Dr. S. J. Lang, Dr. Mary Pope.

Oklahoma, University of, Norman, Okla., Dr. W. A. Fowler.

Platteville State Teachers College, Platteville, Wis., Mr. Fred T. Ullrich.

Providence College, Providence, R. I., Dr. Frederic J. Burns.

Richmond, University of, Richmond, Va., Dr. Cullen Pitt.

Rollins College, Winter Park, Fla., Dr. Robert A. Wise.

State Teachers College, Duluth, Minn., Dr. A. O. Swenson.
 State Teachers College, St. Cloud, Minn., M. Elizabeth
 Barker.
 State Teachers College, Valley City, N. D., Miss Mercedes
 Weiss.
 State Teachers College, Winona, Minn., Dr. G. E. Galligan.
 Virginia, University of, Box 1745, University, Va., Dr.
 Andrew D. Hart, Jr.
 Wichita, University of, Wichita, Kan., Clinton G. McDonald.
 RUTH E. BOYNTON, M.D.,
 Secretary-Treasurer.

Societies

SCIENTIFIC PROGRAM OF THE MINNEAPOLIS CLINICAL CLUB

Meeting of November 10, 1938
 E. S. Platou, M.D., Presiding

THE SIGNIFICANCE OF ENDOMETRIAL CHANGES IN MENORRHAGIA

CHARLES H. MCKENZIE, M.D.
 MINNEAPOLIS, MINN.

In a review of the cases of "menorrhagia", and of "menorrhagia and metrorrhagia" treated at the University Hospital from 1934 to 1937 inclusive, two groups are of interest because of the endometrial pictures presented.

1. *Cystic glandular hyperplasia of the endometrium* (endometrial hyperplasia, Swiss cheese pattern of endometrium, metropathia hemorrhagica): There were 17 cases presenting this abnormal picture at diagnostic curettage. Four women were under 28 years of age, 13 between 28 and 52 years of age, and of these latter, 10 were over 35 years of age. Cystic glandular hyperplasia tends to be a condition of the beginning and end of reproductive life, more commonly toward the end.¹²

The histologic pictures vary slightly in the endometrium obtained from each patient but all show the typical changes in glands and stroma. At curettage, abundant amounts of endometrium are obtained. In section, the stroma gives the impression of compactness and abundance. It appears to be in active growth, for mitotic figures are seen. The nuclei are darkly stained. Throughout the stroma many blood vessels are seen, the arteries often thrombosed and the veins dilated. The glands are irregular in size and shape, some being relatively enormous. The gland cells are columnar and the epithelium tends to pile up, producing multiple layers. The whole picture is that of a persistence and exaggeration of the proliferative phase of the normal menstrual cycle. The stroma resembles that of the proliferative phase in its compactness but appears in greater abundance. The glands, too, are of all sizes, some resembling small cysts. The epithelium of the glands is crowded together and tends to pile up in contrast to the gland cells of the proliferative phase. The endometrium appears uniform throughout, and is not differentiated into the three layers of the secretory phase—compacta, spongiosa and basalis. The endometrium does not desquamate as in normal menstruation. The bleeding comes from the areas of thrombosed vessels, *i. e.*, from necrosis of sites of impaired circulation, or because of increased permeability of the endometrial vessels.

This persistence of the proliferative or postmenstrual phase has been shown by Schroeder, Burch and others to be due to an excess of the follicular hormone, estrone. It has been noted many times also, that the ovaries of patients with cystic glandular hyperplasia of the endometrium contain follicular cysts and do not show signs of recent ovulation or of corpora lutea. Burch³ and Novak¹² believe that there is an imbalance of the gonadotropic hormones of the anterior pituitary glands, that is, that ovarian failure is secondary to anterior pituitary failure. No records are available as to the pathological findings in the

anterior pituitary in women with cystic glandular hyperplasia of the endometrium.

Malignant disease of the uterus is always to be suspected with irregular bleeding. However in an analysis of 534 cases of cystic glandular hyperplasia of the endometrium in women before the menopause, Payne¹³ found cancer of the uterus associated with this condition in only 1.8 per cent. It would appear that the association was entirely coincidental, and that cystic glandular hyperplasia does not predispose to cancer of the uterus.

The condition may disappear spontaneously and the patient return to a normal menstrual cycle. This occurred after curettage in two of the patients, ages 28 and 31. Two patients, ages 16 and 18, had B.M.R.—11 per cent and —19 per cent respectively. On thyroid therapy, they had irregular menses but with less bleeding. They had a return of menorrhagia and metrorrhagia when they discontinued thyroid medication. Treatment has also been directed toward stimulating the ovary or the endometrium by endocrine products. Novak, Burch and others were able to stop excessive bleeding by the luteinizing hormone, Prolan B (A.P.L.) in many cases, but there are also reports of failure of this therapy.⁷ There are several recent reports, too, on the successful use of progesterone for the control of menorrhagia due to cystic glandular hyperplasia of the endometrium.^{2,16,9}

Eventually, since the condition is due to hormonal imbalance, the treatment will be hormonal. But for the present, particularly in the older age group, radiation therapy in sterilizing or substerilizing dosage continues to give best results. Seven patients, over 37 years of age, were given radiation therapy. There is no follow-up of three patients; three patients reported persistent amenorrhea and the seventh patient reported return of normal menses in sixteen months.

2. *Irregular Shedding*: Another cause of menorrhagia has been described by Traut and Kuder¹⁵ by the term "irregular shedding."

"The curettage material showed wide variation in the thickness of the mucosa and the size of the various pieces of endometrium." The histological picture is definite and characteristic. "The stroma is shrunken and composed of many deeply basophilic spindle-shaped nuclei. The spiral arterioles vary somewhat but usually are dilated and engorged. Occasionally, but particularly in those who have bled for some time, there are thromboses of these vessels. In some cases there is extravasation of the blood elements into the stroma. The glands of the peripheral portions of the endometrium are collapsed to form bizarre shapes, many of them suggesting three, four or five-pointed stars. The epithelium is obviously in the secretory or corpus luteum phase, as nuclei of the cells are discrete and located at the base of the cells, while the cytoplasm is clear though low, and irregular in outline, suggesting prolonged activity. Other glands may show little or no secretory activity. But for the most part the impression gained by a study of the tissue is that it is predominantly a secretory membrane. This should serve to distinguish it from hyperplasia, which is just as markedly nonsecretory or proliferative in type."

They consider the menorrhagia simply a prolonged menstrual period. "All the histological evidence seems to point toward a prolonged and weak corpus luteum effect." They present 11 patients with the condition, between the ages of 23 and 50, with normal pelvis and no constitutional disease, who had had prolonged and profuse menses. All but one were cured by curettage, one patient having a return of the same condition.

So far only two histological pictures of the endometrium corresponding closely to the above description and to microphotographs in the original article have been noted.

A 39-year-old woman, para VI—grav. VI, had profuse and irregular menses for one year prior to admission. She had hypertension, B. P. 200/140, a nontoxic adenoma of the thyroid, and was a mild diabetic. On January 7, 1936, curettage was done and the above endometrial picture obtained. She continued to have profuse menses in February and March and was therefore given a sterilizing dose of X-ray in March, 1936. She had mild menopausal symptoms for several months, but at last report was cured.

The second patient, age 35, para II—grav. III, had profuse menses for six months following an abortion. A curettage was

done with no relief. A second curettage was done three months later and these curettings show "irregular shedding" of the endometrium. The uterus and adnexa were found to be normal at this time. The patient did not return and is presumed cured.

COMMENT

1. The histological pictures of the endometrium in a normal menstrual cycle depend on a balance between the ovarian hormones estrone and progesterone which stimulate the growth and changes in the endometrium.

2. Cystic glandular hyperplasia of the endometrium presents a picture of persistence and exaggeration of the proliferative phase and is due to prolonged stimulation by the follicular hormone, estrone.

3. Irregular shedding of the endometrium presents a picture of a prolonged secretory phase and is considered to be due to a prolonged weak stimulation of the corpus luteum hormone, progesterone.

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DISCUSSION

Dr. E. T. BELL: I have tried a great many years to get something out of curettements that would be helpful to the gynecologists in guiding their therapy, but after making perhaps several thousand examinations, I must admit I cannot help them very much. I think we can say that not over one-third of the curettements which we see afford an anatomical explanation for the bleeding. Probably in two-thirds of the cases the bleeding is due to physiological disturbances which are not understood at present. At the present time we have a rather complete knowledge of the way the hormones work on the uterus. We know what estrin will do. Estrin comes from the ovarian follicles and causes the hypertrophy of the endometrium. Immediately after menstruation the endometrium is very thin. Before puberty and after the menopause, the uterine mucosa is very thin; there are only a few small dark glands. After castration, no matter how that is done, a similar atrophy develops. The removal of the ovaries or destruction of the ovarian follicles causes complete atrophy of the endometrium. In the rodents which have been experimented on a great deal with these hormones, removal of the ovaries causes the endometrium to regress to the prepuberty stage. If you inject estrin into the castrated rodent, the endometrium hypertrophies, but it will not attain the premenstrual stage unless progestin is then injected. The cycle may be reproduced in rodents by using these ovarian hormones, but when we attempt to apply this knowledge to a patient we are usually unsuccessful. Progestin will seldom convert the proliferative into the premenstrual mucosa. It is com-

monly believed that the hypertrophic endometrium is due to an excess of estrin, since it may be produced in animals in this way. Sometimes the bleeding may be controlled by curettage, but often more drastic measures are necessary to control severe bleeding. In spite of our knowledge of the action of the ovarian hormones, we cannot use them practically in the control of dysmenorrhea. By examination of the curettement, we can determine whether malignancy is present, and whether there is retained placental tissue. We can diagnose the cystic hypertrophic endometrium. But perhaps two-thirds of the endometria show a normal proliferative phase and give no explanation of the bleeding.

Membranous dysmenorrhea is a clinical as well as a pathological entity. Clinically there is severe prolonged painful menstruation and pieces of endometrium are found in the menstrual blood. Sometimes a uterine cast is discharged. Severe anemia may develop. Microscopically there is a marked decidual reaction in the stroma so that the resemblance to decidua may be striking. There may be confusion with ectopic pregnancy. No satisfactory explanation of membranous dysmenorrhea is available.

Fibrosis uteri was formerly supposed to be a cause of uterine bleeding, but we have learned that the replacement of the uterine muscle by fibrous tissue is a change related to age, and that it is just as prominent in women who do not bleed as in those who bleed. The gonadotropic hormones affect the uterus. I recently studied a case of extragenital chorionepithelioma in which the uterine mucosa resembled that of pregnancy. When over one tablespoonful of tissue is obtained at curettage, one may say that it is either a premenstrual mucosa or a diseased endometrium. If you can scrape only a few shreds of mucosa from the uterus, you are not dealing with carcinoma.

Dr. H. M. N. WYNNE: I wish to congratulate Doctor McKenzie on this work which represents many hours of tedious and exacting labor. I feel sure that the report has been of value to both Doctor McKenzie and the Clinical Club.

Secondary anemia was surprisingly absent in this series. Menorrhagia extending over a period of months or years may cause a high grade of secondary anemia. It is not rare to find the hemoglobin from 40 to 60 per cent.

Chronic cervicitis as a possible cause of menorrhagia should be considered but there are certainly a great many women who have normal menstruation and a severe chronic cervicitis. I believe that retroversion of the uterus as a cause of menorrhagia except following childbirth is rather rare. Estimation of the size of the uterus by palpation alone is not accurate. The thickness of the abdominal wall and the degree of relaxation of the abdominal muscles make accurate estimations difficult; however, with the additional help of the measurement of the depth of the uterine cavity a fair impression of the size can be gained.

A basal metabolic rate is important in cases of functional bleeding. Thyroid therapy will often correct the abnormality in patients who have a low basal metabolism. The anterior pituitary-like hormones have a value for temporary relief during heavy bleeding when administered intramuscularly in doses of three cubic centimeters daily; however, I have been disappointed in obtaining permanent results. Progesterone should be of great value but my experience has been too limited for me to venture an opinion from its use.

Doctor Bell spoke of diagnostic curettage as a method of ruling out carcinoma. I believe this to be true provided the operation is done with care. The entire uterine cavity must be scraped with particular attention given to the top of the fundus and cornua. A curettage preceding a hysterectomy should be checked by opening the uterus as soon as it is removed. The operator will often be astonished to find how few marks of the curet will be found in the fundus.

Radiation with radium or Roentgen rays must be used with exceptional care if we wish to avoid an artificial menopause. Hysterectomy with preservation of the ovaries is often preferred by physicians who have had much experience in treating women suffering from an artificial menopause.

Dr. McKELVEY'S DISCUSSION: Dr. John L. McKelvey, guest of the club, pointed out that he was unable to agree with Dr. Bell's opinion that a diagnosis of a pathological change could

be made in only one-third of the specimens routinely encountered. He stated that it must be borne in mind that not all bleeding is due primarily to lesions in the endometrium itself, but that manifestations of extra-endometrial pathology can be recognized by careful study of the endometrium. Edema and vascular congestion was described as an example of this.

Referring to Dr. McKenzie's description of the morphology of the endometrium in cystic glandular hyperplasia, Dr. McKelvey reminded the members that not all tissue obtained at curettage in this disease showed the classical picture. Various stages in shedding and regeneration following the bleeding phase were described. Basal hyperplasia, generalized and circumscribed, were also described.

A plea was made for more accurate microscopic study of the curettage material, with the prospect of more accurate diagnosis.

Dr. E. T. BELL (Replying to Dr. McKelvey): I do not want to engage in a rebuttal with Dr. McKelvey; I only said that I can't tell why most endometria bleed. I do not think that the cause of the bleeding can be determined in over one-third of the cases from examination of the curettings, but I should be glad to hear Dr. McKelvey explain how he does it. Congestion and hemorrhage in the stroma are present in almost every instance. I cannot see that this feature has any diagnostic significance. The pathologist may call attention to features such as cystic glands, areas of focal necrosis and small polypi; but the clinical interpretation of these alterations is difficult.

Dr. C. J. EHRENBURG: After all, the bleeding of menstruation comes from the spiral arterioles in the decidua compacta, and at the present time the exact relationship of menstrual bleeding to endometrial changes is not known. As Carl Hartmann has pointed out, the observations of hormonal effects on the endometrium have led the study of the physiology of menstruation up a blind alley. If this is true of normal menstrual physiology, it would seem to apply equally well to the abnormal, as the information gained by the study of curettings taken at a single curettement is extremely variable in relationship to the various clinical pictures of disturbed menstrual bleeding.

The observations of Trant and Kuder, mentioned by Dr. McKenzie, from which they assume that the excessive desquamation associated with their menorrhagia cases is the result of overaction of progesterone is interesting when compared to the observations of Randall and Herrell and especially so if we assume that abnormal menstrual bleedings are closely related to the changes produced in the endometrium by the hormones. Herrell and Broders classified endometria much the same as was shown in Dr. McKenzie's diagram naming the four phases as early differentiative, late differentiative, early secretory and late secretory. Later Randall and Herrell, using endometrial biopsies correlated with concurrent estrogen and prolan assays, observed that prolonged estrogenic stimulation of the endometrium resulted in the late differentiative phase often with cyst formation but that abnormal bleedings occurred in inverse proportion to the amount of secretory phase present. They suggested that the secretory phase was dependent on the progesterone from the corpus luteum and that the first sign of ovarian failure was at this point. This suggests that as corpus

luteum function continues to fail, the more apt abnormal bleeding is to occur. Here we have then two views diametrically opposed—one assuming that abnormal bleeding is due to overstimulation with progesterone and the other assuming that abnormal bleeding is due to under-stimulation with progesterone. The recent discovery of Venning and Browne of a method of determining the amount of pregnandiol (which is the metabolic residue of progesterone) in the urine may help to clarify this situation. I believe the study of repeated endometrial biopsies when correlated with concurrent assays of estrogen, prolan and pregnandiol, may, when sufficient observations have been made to establish normals, lead to a definite relationship between abnormal uterine bleeding and the endometrial pattern.

A word might be added about the use of A.P.L. hormone in menorrhagia and metrorrhagia. There is now sufficient evidence to show that polycystic ovaries have resulted from the use of this hormone, and that it is not without some danger. Inasmuch as the effect to be hoped for is the luteinizing action on the endometrium, why not use direct substitutional therapy, with progesterone. Here is a chemically known product which will effect the endometrium but which will have no influence on the ovaries.

Dr. McKenzie noted the high incidence of cervicitis (66 per cent) present in this group of menorrhagia cases. He did not correlate this with the endometrial picture, and I am wondering if any of these showed changes sufficient to call them abnormal. The peculiarities of the cervical lymphatics, the variety of the infecting organisms and the complex structure of the cervical glands would serve to give an extremely variable degree of lymphangitis which in itself could produce abnormal uterine bleeding without a change in the endometrial picture. Certainly, the simple treatment and cure of a cervicitis has given relief from menorrhagia many times in my experience.

Dr. H. B. SWEETSER, JR.: I had developed the idea that retroversion was no longer considered a cause by itself, of bleeding. If that is different now I wish Dr. McKenzie would tell us a bit more about it.

Dr. CHARLES H. MCKENZIE: I wish to thank all those who have taken part in this discussion. The findings in the endometrium of only 19 patients have been discussed. As Dr. Bell and Dr. McKelvey have pointed out, there are many other endometrial pictures and in the remaining slides, I have noticed many with marked edema of the stroma of the endometrium. This endometrium was obtained from patients with myomata of the uterus, retroversion of the uterus, and in one case from a patient with cardiac decompensation. Hormonal therapy will be of value, first, when we have some simple tests for the amount of estrone and progesterone in the blood and urine; and second, when the normals of each have been established. Then we may hope to correct any imbalance in these hormones by stimulating or substitutional therapy. The amount of radiation in all cases of bleeding is very difficult to determine. Many women have permanent amenorrhea, some have a return of a normal menstrual period, and a few are not benefitted. Again I wish to thank all those who took part in this discussion.

L. R. BOIES, M.D., *Secretary.*

NORTH DAKOTA STATE MEDICAL ASSOCIATION

NORTH DAKOTA DEPARTMENT OF HEALTH DIVISION OF CHILD HYGIENE

From the minutes of the meeting of the Maternal and Child Welfare Committee of the North Dakota State Medical Association, Maysil M. Williams, M.D., Secretary.

The Maternal and Child Welfare Committee of the North Dakota State Medical Association met in Grand Forks, December 17, 1938.

At this meeting the Committee approved plans formulated by the Committee Chairman, John H. Moore, M.D., Grand Forks, for the reduction of infant mortality in North Dakota.

Dr. R. E. Pray has expressed his willingness to work out the details of this program.

In North Dakota about 5 per cent of the births are reported as premature. However, 30 to 40 per cent of the infant deaths are reported as due to prematurity. These facts emphasize the importance of an effective plan to reduce infant deaths due to prematurity.

The following aims were discussed and approved by the Committee:

1. The establishment of standards for hospital or home management and feeding of premature infants.
2. The installation of low cost incubators in hospitals in North Dakota, and the placement of incubators in other key spots in the state where hospital facilities are widely spaced.
3. The recommendation of standard techniques of resuscitation of the premature and newborn infants for all North Dakota hospitals.

4. The recommendation of a standard method of feeding the newborn for use in all North Dakota hospitals.
5. The establishment of standard and uniform maternity records in all North Dakota hospitals.
6. An educational program of seminars on the care of premature infants in the hospital centers of North Dakota to be conducted by pediatricians selected by the Committee.
7. Obtaining statistical data on causes of neonatal deaths in North Dakota, insofar as resources permit.

The incubator, approved by the Committee, was assembled by the Chairman in personal collaboration with Dr. A. V. Stoesser of the University of Minnesota, the latter being the originator of the incubator.

The salient features of the incubator include automatic control of humidity and temperature. It is readily transportable, and is of durable construction. The incubator is being assembled with a mercury switch, as an added element of safety when oxygen is being administered. Fifteen hundred dollars has been contributed by one interested donor who wishes to remain anonymous. This gift is to be used to assist financially with the distribution of incubators. Dr. P. G. Woutat was selected by the Committee to act as Treasurer of the gift fund. These incubators are being assembled at the University of North Dakota under the direction of the Committee Chairman.

It will be noted the plan includes seminars to be conducted for nurses, and interested lay groups in the hospital centers where the low cost incubators have been obtained. It was felt that this program would meet with the ready approval of the physicians of the state. The Committee further anticipates the willingness of the physicians to guide lay organizations in their participation in this program.

The present membership of the Committee on Maternal and Child Welfare of the State Medical Association consists of: John H. Moore, M.D., chairman, Grand Forks; J. L. Conrad, M.D., Jamestown; P. W. Freise, M.D., Bismarck; J. D. Graham, M.D., Devils Lake; J. F. Hanna, M.D., Fargo; R. E. Pray, M.D., Fargo; E. M. Ransom, M.D., Minot; P. G. Woutat, M.D., Grand Forks; M. D. Westley, M.D., Coopers-town; Maysil M. Williams, M.D., secretary, Bismarck.

Minnesota State Board of Medical Examiners

**Julian F. DuBois, M.D., Secretary
St. Paul, Minnesota**

DOCKET OF CASES

Mankato Physician's License Revoked

*In the Matter of the Revocation of the License of
ARTHUR W. ECKSTEIN, M.D.*

The license to practice medicine and surgery held by Arthur W. Eckstein, M.D., Mankato, Minnesota, was revoked by the Minnesota State Board of Medical Examiners on December 16, 1938. Dr. Eckstein was found guilty by the Medical Board of "immoral, dishonorable and unprofessional conduct," and, specifically, with procuring, aiding and abetting a criminal abortion.

In 1932 Dr. Eckstein was before the Board on a similar charge and was reprimanded and placed on probation. In 1934 Dr. Eckstein pleaded guilty in the District Court at Mankato to the crime of abortion and was sentenced to two years at hard labor in prison. Upon his release he pleaded with the Medical Board for a chance to take the examination for a new license. Numerous physicians in Mankato endorsed him and a license was finally issued. Dr. Eckstein's first license was revoked in May, 1934.

In the present case Dr. Eckstein was seen on October 17, 1938, in the act of throwing a package over the Minnesota

River bridge at Mankato. Subsequent investigation disclosed the contents as a fetus, with the head severed from the body. He was arrested on the next day charged with abortion. Eight witnesses testified before the Medical Board. The criminal case at Mankato has not been disposed of.

License of Lake City Physician Suspended for Five Years

In the Matter of the Revocation of the License of

GOTTFRIED SCHMIDT, M.D.

The Minnesota State Board of Medical Examiners, on December 16, 1938, suspended for five years the license to practice medicine and surgery held by Gottfried Schmidt, M.D., Lake City, Minnesota. Dr. Schmidt was found guilty by the Medical Board of advertising "professional superiority to, and greater skill than, that possessed by fellow physicians and surgeons" and of "conduct unbecoming a person licensed to practice medicine and detrimental to the best interests of the public."

Numerous complaints had been received by the Medical Board as to the methods used by Dr. Schmidt in making a diagnosis and also in his manner of treating ailments. Letters also had been referred to the Board that were written and mailed by Dr. Schmidt, in his practice, to patients and others. These letters in the opinion of the Board are highly improper. Dr. Schmidt attempted to diagnose diseases by having the patient place some saliva on a piece of paper. Out-of-town patients mailed this paper to Dr. Schmidt at Lake City. He then proceeded to treat the patient by medicine sent through the mail. He also stated that he had a machine with which he could broadcast treatments.

Dr. Schmidt was admonished by the Board in 1936 to refrain from these practices. However, he persisted and the citation resulted. Dr. Schmidt was born in Minnesota in 1871 and graduated in medicine from the University of Minnesota in 1903.

Windom Osteopath Fined \$250.00 for Practicing Medicine Without License

Re: STATE OF MINNESOTA vs. JOHN L. MOORE

On December 22, 1938, John L. Moore, a licensed osteopath with offices at Windom, Minnesota, entered a plea of guilty to an information charging him with the crime of practicing medicine without a license. The Honorable Charles A. Flinn, Judge of the District Court at Windom, sentenced Moore to pay a fine of \$250.00 and court costs of \$7.00. Moore paid the fine and costs in preference to serving a jail sentence.

The complaint against Moore was filed by Mr. Brist on behalf of the State Board of Medical Examiners following an investigation which disclosed that Moore was prescribing and furnishing medicine for the internal use of patients. In the instant case Moore had furnished and administered an alleged cough medicine for a 2-year-old girl. The little girl suffered a burn on the side of her face when some of the medicine came in contact with her face following her refusal to take the medicine. The parents attribute the burn to the cough medicine. Moore then prescribed some medicine for the burn.

The Medical Board's investigation disclosed that Moore was writing prescriptions that were being filled at one of the local drug stores for medicines of various kinds, all of which were to be taken internally. The records of the Medical Board show that Moore was warned as far back as 1930 to confine his practice to osteopathy for which he holds a license.

News Items

Fourteen applicants were granted licenses to practice medicine and surgery in North Dakota following a four-day semi-annual state examination in January. Licenses were granted to: Charles L. Nutzman, Grand Forks, Donald W. Fawcett, Devils Lake, Emanuel Bloedau, Bowman, Alton C. Grorud and Carl J. Baumgartner, Bismarck, Bernard J. Hughes, Bisbee, Joseph A. Hiltz, Bowbells, Wilfred E. Shute, Flaxton, John H. Bartell, Hazen, Philip K. Arzt, Olga A. Miller and Edward A. Hackie, Jamestown, Merle J. Moore, New Rockford, and Nere J. Sundet, Gary, Minn.

Dr. B. A. Dyar, Pierre, South Dakota, has been appointed full time secretary of the inter-allied professional council. The council is composed of representatives of the medical, dental, nursing, hospital and pharmaceutical associations. Dr. Dyar will continue as medical supervisor of the farmers aid corporation.

Dr. F. J. Vollmer, Howard, South Dakota, recently returned to his practice after a year's study at Rush Medical college. He specialized in eye, ear, nose and throat diseases.

Dr. L. G. Dunlap, Anaconda, Montana, was elected president of the Mount Powell Medical society for the ensuing year at the annual election of officers December 19, 1938. He succeeds Dr. J. L. O'Rourke. Other officers elected are: Dr. O'Rourke, Anaconda, vice-president; Dr. LeRoy Bolton, Deer Lodge, treasurer; Dr. F. J. Malloy, Anaconda, secretary; Dr. O'Rourke and Dr. J. J. Malee, Anaconda, delegates to the state convention of physicians, and Dr. Terrill of Galen and Dr. A. C. Knight of Phillipsburg, alternates. The society is composed of doctors of Deer Lodge, Powell and Granite counties, Montana.

Dr. George H. Barbour, Helena, Montana, has been reappointed county physician.

Dr. Olaf Haraldson, Minot, North Dakota, was elected president of the Northwest Medical society, Dec. 22, 1938. Dr. A. F. Hammargren of Harvey was named vice-president and Dr. G. S. Seifert, Minot, was elected secretary-treasurer.

Dr. H. A. Creelius of Plains, Montana, has been appointed county physician and health officer.

Dr. M. G. Danskin, Glendive, Montana, was elected president of the Southeastern Montana medical society at the annual dinner meeting, January 5. Dr. Carroll Lund, Fairview, was named vice-president and Dr. S. E. Olson, Glendive, was re-elected secretary-treasurer. Delegates to the annual meeting of the state medical association are Dr. J. H. Garberson, Miles City, and Dr. B. C. Farrand, Jordan.

Dr. J. L. Mondloch, Butte, Montana, has been appointed Silver Bow county physician.

Dr. Carl Baumeister, formerly of Council Bluffs, Iowa, is now practicing in Robbinsdale, Minnesota.

Dr. J. H. Davis, Belle Fourche, South Dakota, was elected president of the Black Hills Medical society at the annual meeting held recently. Other officers are: Dr. G. W. Mills, Wall, vice-president; Dr. R. E. Jernstrom, Rapid City, secretary-treasurer; Dr. Lyle Hare, Spearfish, censor. Dr. F. S. Howe, Deadwood, and Dr. J. O. Threadgold, Belle Fourche, were named delegates to the state convention in 1939.

Dr. Nere Sundet of Gary, Minnesota, is now practicing in Northwood, North Dakota.

Dr. J. F. D. Cook, Langford, South Dakota, has been appointed superintendent of the state board of health to replace Dr. Park B. Jenkins of Waubay. The appointment was made by Governor Leslie Jensen.

Dr. Robert C. Ray, Eureka, South Dakota, has received the appointment of assistant surgeon in the navy with the rank of lieutenant in the naval medical corps. Dr. Ray at one time practiced in Forman, North Dakota.

Dr. John R. Neal of Springfield, Illinois, has been appointed Dean of the Cook County Graduate School of Medicine. This was announced by the Board of Trustees following their annual meeting in December.

Dr. A. W. Ward was elected chief of staff at Swedish hospital, Minneapolis, at the annual meeting January 21, 1939. He succeeds Dr. O. H. Peterson. Other officers are: Dr. Nels Gunderson, vice chief; Dr. Paul Gronvell, secretary; Dr. Charles R. Drake, treasurer.

Dr. G. R. Christie and Dr. B. V. Van Valkenburg, pioneer physicians of Long Prairie, Minnesota, were honored at a dinner sponsored by the Commercial Club, November 29, 1938. The meeting was given in appreciation of the many services the two doctors have rendered the community.

Necrology

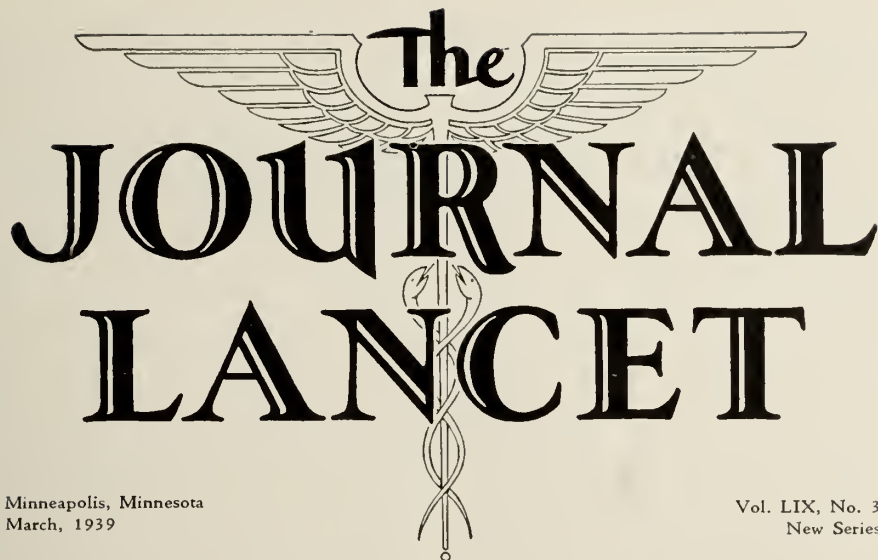
Dr. Willis Henry Haviland, 74, of Butte, Montana, died at his home January 15, 1939. He had practiced in Butte for fifty years.

Dr. N. O. Dalager, 60, physician at Anamoose, North Dakota, for the last seven years, died December 27, 1938, in a Minot hospital. Dr. Dalager was born in Austin, Minnesota. He was graduated from Rush Medical School and for a number of years practiced at Clear Lake, Iowa, and then in Carpio.

Dr. Archibald A. McLaurin, 62, Pierre, South Dakota, died January 5, 1939, following a year's illness. He had practiced in Pierre for twenty years.

Dr. W. T. Stone, 83, retired physician of Park Rapids, Minnesota, died at his home December 25, 1938. Dr. Stone had been a resident of Park Rapids for 40 years and had established the first hospital in the community.

Dr. David L. Axilrod, 61, Minneapolis, died January 14, 1939. A retired physician, Dr. Axilrod had practiced medicine at Hutchinson, Minnesota, for many years.



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New Series

Accuracy in Eye Examination *

Lawrence G. Dunlap, M.D., F.A.C.S.
Anaconda, Montana

THE intention of the following remarks is not to bring out new facts, but to recall to your minds old well-established facts in reference to the examination of eyes and the importance of an accurate eye examination. It has been said many times that faulty diagnoses are not due to ignorance but to laziness. Everyone is familiar with the signs and symptoms of syphilis, tuberculosis, diabetes, high blood pressure, etc., but being preoccupied at the moment, the examiner often is too lazy or fails to think of these possibilities.

An accurate examination of the eyes consists of far more than taking the visual acuity or correcting defective vision with lenses. Eyes are paired organs with complicated nervous and muscular coordinations which are most important. Also, not only visual acuity, but fields of vision and coordinated ocular movements are of prime importance. An accurate eye examination does not necessarily entail a long tedious procedure but it does necessitate intense thought and appropriate action backed up by adequate knowledge and experience. It is needless to tell you that the eye physicians in Montana are thoroughly qualified to give these eye examinations. The details of an accurate eye examination are as unnecessary to enumerate here as would be the details of cholecystectomy or cesarean section in a paper on those subjects.

It is to be assumed and may be taken for granted that practitioners of medicine and surgery are referring cases for eye examination to well-trained men. It is justifiable and not presumptuous, however, to recall from time to

time what constitutes an adequate eye examination, including a preliminary examination without a cycloplegic, a checking of the near point of accommodation and convergence as well as monocular and binocular movements and vision of the eyes, pupillary reactions and general external ocular inspection. This, however, must be followed with examination under a cycloplegic to allow a visual examination uninfluenced by the accommodative effort on the part of the patient. A paper by O'Rourke who was trained by that great Dean of American Ophthalmologists, Edward Jackson, states, "One should not hesitate to use a cycloplegic at any age, provided the individual patient demands such treatment. There can be no doubt that refraction under cycloplegia for most of us is the surest method. Regardless of one's accomplishments with the undilated pupil, a complete, satisfactory, ophthalmoscopic examination demands a dilated pupil."

A fundus examination with the ophthalmoscope is often most instructive and of the utmost value. An early diabetic or nephritic condition may be found. Failure of the two eyes to function as a single unit may cause the greatest ocular distress including headaches, general nervous upsets and inability to carry on. This ocular imbalance can be readily checked by fusion tests with the Maddox rod but often can be uncovered only after repeated occlusion of one eye with a patch for from five to seven days. Marlowe of Buffalo demonstrated this test in 1912, but it has been most difficult to get its general acceptance. Hence, muscular imbalances are often called "rich man's disease" because the patients

* Read before the Medical Association of Montana state meeting at Lewistown, Montana, September 5-6, 1938.

must go from consultant to consultant until they reach someone who will take the interest and devote the time necessary to uncover the error underlying the condition.

Every medical student in his preclinical physiology days learned that the new-born child had no macular function or sharp definite visual area of the retina. By the age of three to six months the maculae of the retina or area of central vision of fixation point has developed in each eye and no longer do the two eyes wander about independent of each other, but they begin to work together with both horizontal and vertical parallelism. This is known as binocular vision. Furthermore, every man has been taught in his early days in physiology that if macular or central vision or visual acuity is not developed by the age of seven that it is practically impossible to develop it afterward.

Imagine the daily distress of the ophthalmologist who sees patients 8, 10, and 12 years old with no vision in an eye which is crossed out or in, when he knows that vision cannot be developed at such late ages. The parents repeatedly say that they thought that the child would outgrow the crossing of the eyes and now only a cosmetic result with no visual improvement can be secured by glasses or operation or both. It is hardly necessary to recall that an accurate refraction and prescription of glasses can be made for a child of 18 months or older and that if glasses are going to straighten cross-eyes, it will accomplish this result within three months. Thus operating on cross-eyes can and should be done at the age of three or as soon thereafter as possible. This will prevent so much amblyopia or failure to develop macular vision that it will serve as a monument to every practitioner of medicine. It is often necessary to occlude the seeing eye of a child before the age of seven in order to make that child use the poorer eye, because if the vision is not developed before the age of seven, it is never developed.

The human eye can undergo change in accommodation in 1/400 of a second, which makes it necessary to put the eye at rest for an accurate examination. One would be only too willing to give up the use of drops if he could accurately measure a refractive error in less than 1/400 of a second.

How often does one hear of abdominal operations, chiefly pelvic, and all sorts of medical treatment being rendered to patients for the relief of headaches when the logical approach to an accurate diagnosis would have been an accurate eye examination—in other words, examining the area where the pain was located. How often does one see tinted lenses of all types from light to dark shades in crookes, soft-lite, fieuzal, novioli, calorbar, and Ray-Ban, prescribed when patients complain of susceptibility to light forgetting that humans have been on this earth approximately one million years and two-eyed animals approximately one hundred million years, and someone in the Twentieth Century presumes to upset the automatic balance between the medullary brain centers for ocular accommodation, convergence, and pupillary actions. One should recall that only in the past relatively few generations have humans lived in darkened places, worked under artificial light and

forced their eyes to undergo the strains of civilization for which their eyes were not originally constructed.

To quote from a world famous authority on eyes, "The frequency with which patients are referred to non-medical examiners for ocular examination reminds one that medical practitioners apparently forget that an examination of the ocular apparatus is as much a medical affair as an examination of the heart, lungs, or kidneys." A complete ocular examination, the correct interpretation of the findings, and the proper carrying out of the right treatment is the eye physician's problem and duty. Detailed study brings out hidden imbalances of the extra-ocular muscles, and, perhaps, discovers a low grade or beginning glaucoma. Even increased intracranial pressure may be first discovered by the investigating ophthalmologist. Therefore, refraction or examining the vision is but the beginning of a complete and adequate eye examination as a part of a complete medical examination.

Patients in Montana should be grateful that glaucoma of any and all types is relatively rare. However, thought processes should never be lazy and one should always think of the possibility of glaucoma and be careful not to put atropine into a glaucomatous eye. Likewise, one should insist on atropinizing an eye with iritis whether the tension is high or low. As soon as a cataract prevents serviceable vision in an eye, it should be removed whether the other eye has a cataract or not. With the modern methods of cataract surgery, waiting for a cataract to ripen and the eye to go blind is a "myth of superstition" and a most pernicious one—allowing one eye to go on perhaps to irreparable blindness from an over-ripe cataract or glaucoma.

Bifocal lenses are a necessary evil if people persist in living past 45 years, and if they are so persistent as to live past 80, they must have lens sclerosis if not complete lens opacity or cataract. Hardening or sclerosing lenses increase in their refractive index so that if their owner can see to read at close range without glasses, certainly he can not see clearly at a distance without lenses. It has been said that 95 per cent of our intelligence is gained through the sense of sight, four per cent through the sense of hearing, and one per cent through the sense of taste, smelling, and feeling. One should try not to allow a patient to reach middle life with one seeing eye and an under-developed visual sense in the other, and then have him lose the good eye and of necessity live through the rest of his days with a poor visual function. Do not condemn an ophthalmologist for being an inefficient "fitter of glasses" when the patient lives, works, sews and reads in 10 candle foot power illumination when it takes a minimum of 30 candle foot power illumination for sustained visual effort over long periods of time. However, one should remember the associated and delicately balanced action of the two eyes is easily thrown out of balance because of no or improper lens correction, muscle imbalance, poor lighting conditions and "physiology gone wrong." A brief but comprehensive history is most essential. Direct questioning will bring out the facts of importance at a much greater saving of time than if the patient is allowed to ramble on indefi-

nately reciting many irrelevant statements. History is important in obtaining useful information. However, the patient's "story" must be guided along proper channels if time is to be well spent. Conciseness is a virtue and leading questions are of greatest importance. Young children at the age of three may be taught by a patient nurse to indicate the direction of the limbs of the letter "E" on the illiterate chart so that actual visual acuity may be determined. A patient at 17 months refused to

drink her morning Austrian coffee until she had pointed at the top of the dresser indicating her desire for her glasses which made her see better.

In Montana, or as the Indians called it, "The Land of the Shining Mountains," your eye physicians will be glad to cooperate in obtaining accurate eye examinations, and securing for all the people visual acuity which is ideal or as near the ideal as possible.

The Sinus Problem*

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IN a large number of cases, sinus disease is the result of the common cold or a coryza accompanying influenza, both of which, as far as prevention is concerned, have remained largely beyond our control. Every severe cold is undoubtedly complicated by sinus disease, and it is common observation that the majority completely clear up with recovery from the cold without any special treatment.

Last spring, in Portland, Doctor Furstenburg stated that he had studied 300 cases of acute nasal accessory sinus disease. A clinical and radiographic examination was made in each instance, and the patient hospitalized for periods ranging from three days to two weeks. The treatment of these patients involved conservative measures such as rest in bed, hot compresses over the sinuses, and occasionally saline irrigations in the latter stages of the disease, when the purulent discharge became profuse. He stressed the point, however, that nothing of a surgical nature was used in any of the patients, not even needle puncture and lavage of the antrum. Morphine in adequate doses, whenever indicated, was given hypodermically for pain. Subsequent examination of these patients, six months to three years later, revealed a complete cure of all but 14. This latter group had further attacks of acute nasal accessory sinus disease, and many of them had been treated surgically outside of his own clinic. The check-up examinations also included a radiographic as well as a clinical study.

There is then a very strong tendency to recovery in these cases. The cases discussed here are those which do not recover with the recovery from the cold. These cases do not recover because most often the sinus does not drain properly (due to a deflected septum, a narrow nose from early mouth breathing, swollen turbinates) or, possibly there are sinus involvements because the acute coryza does not have the proper treatment. In my experience, when one has a case of sinus disease which has not recovered with the recovery of the coryza, something very definite has to be done. It may be possible

to overcome the difficulty by local treatment, displacement treatment of Proetz, shrinking the membrane and packs, or, shrinking the membrane and painting the nose with a stimulating astringent. Anyone of these procedures may turn the tide and bring about recovery from a sinus attack which has not spontaneously recovered.

There are, however, sinus cases which still persist, cases that from the very nature of the nose (deflected septum, or other anatomical reasons) could not be expected to recover spontaneously or from local treatment. The rhinologist has those cases come to his office for relief. The following are examples.

Case 1, girl, age 6. A history of hay fever with constant symptoms which followed whooping cough a year ago, was given. Drafts made it worse; certain foods caused eczema; the nose was stuffy. The cause was thought to be allergy. A few skin tests were done and were negative. She had tonsils and adenoids; pale boggy membranes with watery discharge blocking the nose. On transillumination both antrums were cloudy. It was advised that the tonsils and adenoids should be removed, and the antrums opened under the lower turbinates. After some reluctance, the parents consented, and, under general anesthesia, the tonsils and adenoids were removed, and the antrums opened. The antrums were filled with muco pus. They were irrigated a few times. About one month after the operation, the mother volunteered, "I do not believe this youngster really had allergy or hay fever."

Case 2. A machinist who came from a distant city had moved from one part of his city to another, and after moving began to have hay fever symptoms and asthma with nasal discharge. He found it very difficult to work the past two years; it was worse in summer, but he had some difficulty the year round. His nose was swollen shut; the membranes were boggy and pale with a watery discharge and would not shrink. On transillumination both antrums were black. He was advised to have nasal antral windows below the lower turbinates, not that it would relieve him of the allergy or asthma, but that it would lessen the swelling of both turbinates so that his breathing would be more free and that the nasal discharge would be lessened. This was done, and one month later, to our mutual satisfaction, he had lost his allergy, asthma, and most of the nasal discharge.

Case 3. A boy, age 16, had had repeated colds since six years of age and almost constant headaches. He had had tonsils and adenoids removed. His father was a mine operator and they had lived in the Black Hills, Canada, and Montana. He had been treated by a number of doctors, had been put to bed

* Read before the Medical Association of Montana state meeting at Lewistown, Montana, September 5-6, 1938.

and treated in general for colds which he had one after another, with very severe headaches. No one had suspected his sinuses. His nose was swollen and did not respond to local treatment. The membrane was pale, boggy, edematous. He was advised to have a resection of the nasal antrum wall below the lower turbinates. They had heard so much advice against operations for sinus that it was six weeks before the parents consented to have the work done. Both antrums were filled with muco pus. During the first month the patient had one headache following a cold, where previously there was never a day without a headache, sometimes mild, but more often very severe. There is still some nasal discharge, but freedom from headache and a fresh cold every few days has changed the outlook for the patient. He has gained several pounds in weight.

Case 4. A man in the teaching profession last winter had an attack of coryza, which persisted, suggesting that he might be even becoming allergic. The mucous membrane was typically allergic (white, boggy, pale) and responded to no medication. Ephedrine in oil and in water, cocaine, and adrenalin had almost no effect in shrinking the membrane, and packs and suction were without benefit. Astringents appeared to aggravate the condition. Treatments always aggravated it so that the patient, after a few weeks, did nothing but snuff and sniff, and he did that for four or five months. Finally, his superior told him that, unless he could get relief, he could no longer hold his position, as the distraction was just too much for the students.

It was impossible to promise him a cure, but one could tell him positively that what was suggested could in no way make him worse, and that he would be improved. A complete sub-mucous resection was done, and a good nasal antral window below the lower turbinate on each side was made. There were a few irrigations, but not many. This patient now breathes better than he has for years. He has no inclination or desire to sniff or snuff. His superior is satisfied, and the patient has his job, and apparently has no allergy.

Case 5. One afternoon a patient came into the office, literally walking the floor. He had not slept for four nights and could hardly stay in a chair long enough to have his nose examined. The mucous membrane was swollen and edematous. His pain was not relieved by shrinking the membrane, so, I anesthetized it after transillumination had indicated the right antrum at fault, and made a trephine opening below the turbinate. Because he was a very nervous type, I told him not to discuss his treatment with any of his friends or clients, his business being largely with young folks and their mothers. He came back the next day so jittery he could scarcely talk. He had no pain, but, he had been convinced that he was ruined for life. Among the roomful of clients who had assembled while he was having his antrum opened, was one who thought she knew something about these conditions, who kept repeating that if she had only known beforehand she could have kept him from having this done, as, from now on, he would be an addict to nasal operations. I asked him if his head ached or hurt since he had his antrum opened, and he said no. I asked him if I had not predicted what he would be told if he discussed his troubles, and he confessed I had. That was four or five years ago, and he has not had an attack since. I see him often, and he now laughs about his plight.

Case 6. A medical man came in in almost the same condition, except that he had walked the floor only two nights. There was one way I could give him relief, and that was by trephining. He also felt that he was taking a big chance, but the pain was so severe that something had to be done. He was promptly relieved, and has not had another attack. That was five or six years ago, and he now thinks he had the proper treatment.

Case 7. A miner came to the office because of debility, nasal obstruction and mucous in the throat. This had lasted for years. He had a very large perforation anteriorly, an obstructing deviation of the septum behind the perforation, and bilateral antrum infection. It was impossible to resect the nasal antral wall on the left until a sub-mucous resection was done behind the large perforation. The condition was chronic, and I told him that a Caldwell Luc would in all probability be necessary, but that we would try the physiological surgery first. I straightened the septum, and made a good opening below the tur-

binates. In chronic cases, the more foul the discharge the better the prognosis. In this case the discharge was very foul, and promptly cleared up. The patient gained 30 pounds in weight, and, there has been no discharge or mucous coming from the antrums for some time.

Many similar cases could be reported together with the histories of a large number of cases in which patients have had a diagnosis of sinus infection for which surgery has been advised. They have frankly stated that they had been told that sinuses should never under any circumstances be operated; that, if once an operation was done, from then on operation after operation would follow. Perhaps two-thirds of them come back, after having gone to some clinic, or to some other office where they have been operated upon with good results. At least, those whom I see again have had good results, and they appear to be satisfied, hence I am sure that other men are getting good results from the proper surgery. The cases I have reported have been almost entirely acute or sub-acute, and my results with acute and sub-acute cases have been uniformly good. My failures have been in the chronic cases in which I have had difficulty in getting the patients to consent to the thorough sinus work necessary, and in those cases complicated by some systemic condition such as allergy. But, even in allergy, the patient should have as much consideration in a sinus infection as a patient without allergy.

At the meeting of the Pacific Coast Oto-Ophthalmological Society in Butte, a paper, entitled, "When Should Sinuses Not be Operated?" was read. The failures were in chronic in contrast to acute sinus disease, and in cases not primarily sinus infection alone. Doctor Oaks states that "the upper respiratory tract mucosa is the most sensitive and most responsive tissue in the organism. Therefore, it should be expected that the nasal mucosa might reflect changes not unlike sinus infection in such conditions as anemia, low gastric hydrochloric acid, acidosis, alkalosis, low calcium metabolism, high sodium chloride in the tissues, endocrine disturbances, pelvic disorders, allergy, and mental disturbances." Quite obviously, sinus surgery without consideration or treatment of the general condition will be doomed to failure.

There are some chronic cases which have existed so long that the pathology has not only involved the membrane to its depth, but has extended even through the bones to the dura, and they are not going to be cured by operative procedures.

Two conditions very rarely are seen today: First, enlarged glands of the neck, so-called tuberculous glands, which require surgical removal, are rare because diseased tonsils, which cause most of them, are now removed before the glands of the neck become involved. Second, chronic running ears requiring radical mastoid surgery are rare because tonsils and adenoids are always removed in such cases, and, if that, together with systemic medication, does not bring about the cessation of a running ear in a reasonable length of time, a thorough simple mastoid is done on the single symptom of pus continually coming from the ear for six or eight weeks. This almost always brings about a dry ear, without loss

of hearing. In the same way there should be very few chronic sinus infections from the so-called colds and influenza, if they are taken care of before they become chronic.

If our observation in acute coryzas is correct, confirmed by Doctor Furstenburg's study of acute sinus disease, the vast majority of the acute sinuses will recover under the proper general treatment, and some of those who do not will with local treatment such as shrinking the membranes, suction, displacement of Proetz. If treatments do not help, then physiological surgical treatment should give relief to those who do not have systemic conditions such as allergy adding to the nasal symptoms, illustrated by the cases reported. By physiological surgery, I mean surgery which puts the nose in the best anatomical relationship for normal function without destroying or scarring any mucous membrane. All the acute cases reported have had that surgery done, and patients have recovered or improved. Anatomically, the nose is physiologically best when there is breathing space equal on both sides, the turbinates are of normal tone to moisten the air, and no sinus openings are obstructed. The sub-mucous resection may be necessary to open the nose to equal free breathing on each side, and I believe it is neglected more often than it should be. If any sinus in the nose is involved, with the possible exception of the sphenoid, the antrum will be involved either primarily or secondarily, and, if it does not clear up under treatment, should have at least a window resection below the lower turbinate. The resection should be done without damage to the turbinate, and the opening should remain open, if done properly. A window not only helps drain the antrum, but relieves the swelling of the membrane of the lower turbinate, and also the middle turbinate. This is especially noticeable when the frontal is also involved. The improvement in the breathing space is so much better, and the drainage is so much improved that I never feel that I can treat a frontal properly until the antrum has had a resection. Beginning in this way, it is surprising how little else is necessary for most acute frontal sinusitis. I speak of these procedures as physiological surgery because no membrane is sacrificed, and function is improved. In fact, unless a probe is used, or the nose markedly constricted, no one can see that any operative procedure has been done for the sinus.

I must emphasize here that I am not in favor of exenteration of the ethmoid labyrinth, or of an attempt to enlarge the frontal duct, or the removal of the turbinates, in the operative procedure for the acute and sub-acute sinus infections. In the first place, such procedures do not leave the nose in good physiological and anatomical condition, and, secondly, if the septum is straightened and a permanent opening made below the lower turbinate between the nose and the antrum before the sinus membranes are deeply involved, the sinus clears up. A very important part of this procedure is that the naso-antral opening be made so that it stays open.

What logic can there be in not draining a pocket of pus from the nose? In what possible way could such a procedure be condemned, or, how could it be the be-

ginning of a series of operations, when properly done? One cannot make a nose better than a normal nose, and a normal nose has sinuses which become involved from colds and influenza, and a normal nose has a cold or coryza every so often. A patient with a tendency to cold, or with a lack of resistance for that sort of infection, will probably get a cold with a flare-up of sinus infection, but he is less likely to have a chronic sinus involvement than he was before his nose was made anatomically as good as possible. The very worst that could happen would be that the opening below the turbinate was closed, and then he is exactly the same as if no operation was done on the sinus. If the operation was not worth while, he does not have to have it done again. I have never seen a patient who was worse from this kind of surgical operation. The majority are greatly improved. Chronic cases may not be entirely relieved of their nasal discharge, and not helped as far as clearing a focal infection is concerned. Most of them are relieved from headaches, and have better breathing space, but, the thorough removal of the infected membranes would be necessary for recovery.

If patients are to be prevented from getting chronic sinus disease, it will need the help and coöperation of every medical man in telling his patients that it is early care and early operation of the right kind that will prevent sinus disease from becoming chronic and difficult to cure, just as the profession is now telling them about cancer. If the operation does not cure, it was not done soon enough, or, there are underlying conditions continuing the local nose symptoms.

I hope I have made it clear that I am speaking of acute sinus disease, and that the point I am emphasizing is that chronic sinus disease can be prevented, just as chronic discharging ears can be prevented by the proper treatment and operation before they are chronic; that physiological surgery does not make a sinus condition worse. It can only fail to give relief, if delayed beyond the time possible for recovery, and, even then, the patient can in no way be made worse. In fact, many of the chronic patients, after these operative procedures, have a great deal of relief.

SUMMARY

- (1) Most acute sinus disease gets well with the cold or influenza, without special local treatment.
- (2) If it does not get well with the cold, it will not spontaneously get well.
- (3) If it does not, local treatment will help a certain percentage of patients to get well.
- (4) If local treatment does not cure, constructive or physiological surgery, if done reasonably soon, will cure almost all; in fact, I believe all patients excepting allergics or those having nasal symptoms caused by systemic conditions. It will help many of these, as the allergist now believes. An allergic patient should be entitled to the same consideration in a sinus infection as the non-allergic patient.
- (5) Physiological surgery, as I have outlined, does not add to the sinus patient's troubles, does not make him worse, nor make him an addict to operations.

Acute Diffuse Bronchiolitis*

With Report of Case

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WHILE variations in the manifestations of respiratory infections and pneumonia are common clinical experiences, the features presented by this case seemed to mark it as a clinical entity. Its characteristics stood out clearly from other infections of the respiratory tract commonly seen in a young adult group and were deemed worthy of report.

CASE REPORT

A young woman, aged 20, a nurse, while on duty on a contagious service, ten days prior to admission to the hospital, developed a mild respiratory infection with slight sore throat and paroxysmal cough. The minimal temperature reaction increased to 102° twenty-four hours before admission. No chills or chest pains were noted. The past history was not important. The Mantoux test was negative the previous year.

Examination showed absence of marked prostration, moderate cyanosis and slight dyspnea. Medium moist rales were noted over the right anterior and posterior chest and left base, without alteration in breath sounds, resonance or fremitus. The signs became quite diffuse with medium and rather fine moist rales throughout both lung fields and more numerous at the bases. Pain associated with pleural friction rub developed in the left axilla and lower anterior chest without demonstrable pleural effusion. Early X-ray films of the chest showed little change, later films showed increased diffuse broncho-vascular markings throughout both lung fields with mottling, particularly at the lung bases. Conclusion of X-ray study: Purulent bronchitis and bronchopneumonia. (Dr. L. G. Rigler.) Later chest films showed clearing of process. Film of the nasal sinuses showed diffuse cloudiness characteristic of pansinusitis.

The laboratory data showed leucocytosis of from 16,400 to 31,400. The hemoglobin of 89 on admission dropped to 61 per cent at the end of the febrile period. The sputum was moderate in amount, purulent in character, never rusty and rarely blood-streaked. Dr. W. W. Spink reported almost pure growth of *H. influenzae* in the sputum; later hemolytic streptococci predominated. Tubercle bacilli were not found. The maximum temperature and pulse elevation occurred on the 11th hospital day; moderate prostration and increased cyanosis and dyspnea occurred with increased temperature elevation and tachycardia in the middle of the process. The cough tended to be paroxysmal and was severe at times. The rate of respiration seldom reached thirty. The morning temperature quite occasionally exceeded that in the afternoon. Temperature fall to normal by lysis had occurred by the 19th day of the definitely febrile period. The special therapy consisted of the use of oxygen, blood transfusions and sulfanilamide.

DISCUSSION

The outstanding physical finding was the presence of medium and somewhat fine moist rales over considerable portions of both lung fields, which later became quite universal. In the absence of signs of frank consolidation and appreciable alteration in breath sounds, the impression gained was that of acute diffuse bronchiolitis as distinguished from bronchitis or bronchopneumonia. X-ray findings became positive later with the development of contiguous areas of bronchopneumonia, and sim-

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Fig. 1. Increased broncho-vascular markings with diffuse mottling particularly at lung bases.

ulated the findings of miliary tuberculosis. The course of the disease was characterized by mild respiratory symptoms and slight fever of nine days' duration followed by the febrile period of nineteen days. The temperature was moderate and fell by lysis.

We are indebted to Dr. W. W. Spink¹ for his examination; he also carried out bacteriological studies of the sputum and noted early an almost pure growth of *H. influenzae* (Pfeiffer) and later predominance of hemolytic streptococci. Dr. Spink called attention to Mulder's report on acute and chronic purulent bronchitis seen over a period of years in Sumatra and the Netherlands. Mulder,² in this group of 205 cases noted 20 cases of bronchiolitis; the picture was similar to that here reported. He noted its more frequent occurrence in infants and in the aged and its occurrence in adults during influenza epidemics. *H. influenzae* (Pfeiffer) was found early in the course of the disease in all of the cases of bronchiolitis; mixed infections were sometimes noted. Mulder considers that most cases of common purulent tracheitis, bronchitis, and bronchiolitis are due to *H. influenzae*. He considers that the clinical picture of acute capillary bronchitis with miliary lobular pneumonia due to infection with *H. influenzae* is a clin-

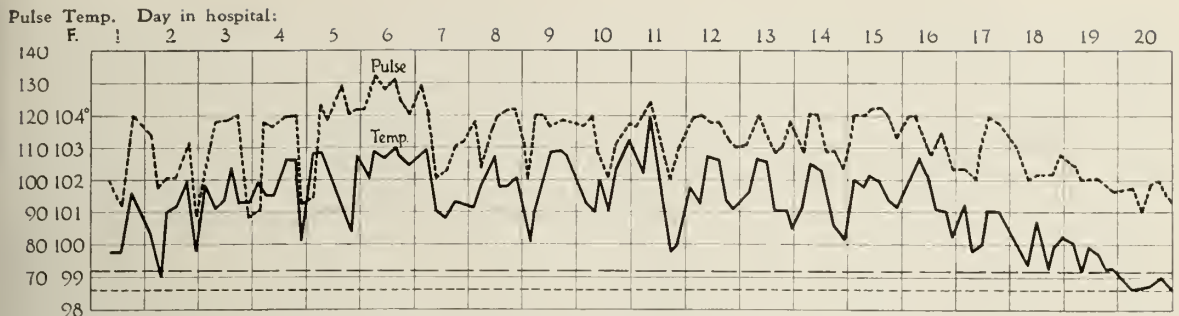


Fig. 2. Temperature and pulse curves after admission to hospital.

ical entity and rather common, occurring independently of epidemics.

Hammond³ and others, and Abraham⁴ and others, noted cases in the military service in the World War with similar manifestations except that the disease reached epidemic proportions with high mortality rate. These cases were described before the outbreak of the influenza pandemic of 1918 under the term purulent bronchitis. Study of pathology showed bronchiolitis with exudate in the bronchioles, sometimes with contiguous areas of pneumonia.

Scadding⁵ recently described cases with similar manifestations for which he suggests the term disseminated focal pneumonia. Reimann,⁶ in his recent monograph on the pneumonias, describes cases as capillary pneumonia (capillary bronchiolitis) and notes that the etiology is not well studied, and that the condition is often noted in measles. Atypical pneumonia, dissimilar to the case herein reported, has been noted in this community during the past few months, in which pneumococci have rarely been found. Such cases challenge interest as to their nature and etiology. The present conception of the virus etiology of influenza adds interest to the consideration of the causation of atypical infections of the respiratory tract in which pneumococci or other predominating organisms have not been demonstrated.

SUMMARY

The features presented by the case reported appeared to define it as an entity and to differentiate it from infections of the respiratory tract usually encountered. The

onset, with mild respiratory symptoms and slight temperature, was followed by a somewhat protracted febrile period with fall by lysis; physical findings were those of a diffuse bronchiolitis rather than bronchitis or bronchopneumonia. While of rare occurrence in a young adult group during recent years, reports of similar cases indicate that bronchiolitis with similar features is not uncommon in infants and the aged and that during epidemics it is also often seen in adults. The entity described here and elsewhere suggests a specific etiological agent.

(NOTE: Since presentation of this report, Reimann⁷ has noted a series of cases, some of them presenting the same clinical picture as herein described. Two of his cases presented additional symptoms of encephalitis and he raised the question of filtrable virus etiology. It is of interest that the clinical entity presented by the case here reported fits in well with some of Reimann's cases and that the picture seems identical with that also reported from widespread sources as herein noted.)

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Peptic Ulcer*

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IN the earliest attempt at the X-ray diagnosis of gastric conditions, most workers depended on a correlation of the patient's symptoms, the analysis of the gastric secretion, and the motor phenomena of

the stomach and cap as observed fluoroscopically. Much stress was laid on the presence or absence of gastric retention of the barium meal for more than six hours as an indication of the presence or absence of a lesion. Little progress was made until all these factors were discarded and an attempt was made to visualize the

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actual lesion on the X-ray plate. Gradually, enough operative and autopsy material was obtained, and the findings compared with the X-ray plates. Then, and then only, did the roentgenologist begin to make definite and accurate diagnoses.

Dr. Lewis Gregory Cole, of New York City, was the first American roentgenologist to recognize the value of the plate method of diagnosis. His method was slow to gain general recognition. Some 30 years ago he agreed with Dr. George Brewer to take 50 patients, suspected of having gastric lesions, and subject them to an extensive X-ray examination of the stomach by the plate method. Dr. Brewer had agreed in advance to subject all the patients to an exploratory operation regardless of the X-ray diagnosis. The operative findings confirmed the X-ray diagnosis in 86 per cent of the cases. These results are all the more astounding considering that X-ray examination of the gallbladder was practically unknown at that time. Most of the 14 per cent error was due to confusing gallbladder adhesions with duodenal ulcers.

Thus, the plate method of diagnosis as opposed to the fluoroscopic method obtained relatively early favor. This popularity was deserved, for the men who used the plate method spoke in exact terms, translating the abnormal shadows seen on their plates into pathological terms. Today both methods have their followers, but even the most ardent fluoroscopists make some plates and even to their highly trained eyes the plates often show lesions entirely missed on the screen.

It is best to use both methods on every patient. Undoubtedly, the fluoroscope is of tremendous aid in recognizing and identifying lesions in the cardiac end of the stomach. Lesions in the lower two-thirds of the stomach and lesions in the cap are easily recognized and differentiated by the plate method. These statements are true even for men who spend a large part of each day fluoroscoping stomachs. How much more important it is for the man who uses the X-ray only as an adjunct to his general practice, even if relatively unfamiliar with gastric diagnosis he can obtain consultation from a well made series of plates. Furthermore, he can, by comparing series of plates made at different times on the same individual, note the progress of the lesion as accurately as he can observe the healing of a fracture or the spread of an osteomyelitis.

While elaborate apparatus can speed up the examination, simple apparatus in the hands of a good technician can turn out an entirely satisfactory set of plates that are diagnostic. Roentgenology is becoming more of a consultation specialty each day. We see the X-ray plates on several hundred patients each month, sent to us by other physicians for an opinion, and are able to give as satisfactory an opinion as if the patient had been examined in our office. This applies to every area of the body except the stomach. There is no reason why the stomach should not be included except for unsatisfactory technique. Technicians are perfectly capable of making satisfactory plates of the stomach if properly instructed. It is for this reason that I am devoting the major portion

of my time to the method of making the examination and the remainder of the time to the few simple points which will generally serve to differentiate benign from malignant ulcers, as well as from other conditions with which they are sometimes confused. Only two pieces of apparatus are necessary to make a satisfactory X-ray examination of the stomach: (1) an erect and a horizontal fluoroscope, or better still the two combined in a tilt table; (2) a transformer capable of allowing 80 milliamperes of current at sufficient voltage to secure satisfactory penetration. This will enable the exposure time to be constant at $\frac{1}{4}$ of a second. It is not necessary to have the exposures shorter than $\frac{1}{4}$ of a second. While exposures of $\frac{1}{2}$ second are quite often satisfactory, we have found that exposures of $\frac{1}{4}$ second are eminently satisfactory in all patients regardless of the rapidity of gastric peristalsis. By using the standard technic of 80 milliamperes and an exposure time of $\frac{1}{4}$ second, the only factor we have inconstant is the voltage which we adapt to the thickness of the patient.

There are many satisfactory barium meal mixtures. We use an 8- to 12-ounce glass of barium malted milk and cold water to which $\frac{1}{2}$ ounce of petrolagar is added. This gives a smooth suspension which does not unduly nauseate or constipate the patient. This mixture is administered with the patient standing before the erect fluoroscope. He faces the screen obliquely, his anterior right axilla being against the screen. He drinks with the glass in his left hand, his right hand resting on his right buttock. This gives an unobstructed view of the esophagus. The patient is then fluoroscoped in the horizontal position lying on his back. This gives an excellent view of the cardiac end of the stomach and enables us to see if there is any herniation of the stomach through the esophageal opening. If any suggestion of a lesion is noted we immediately make a series of plates with the patient lying on his back. Only in this position can carcinoma of the cardia, especially if it be on the greater curvature side, be demonstrated.

The patient is then turned over on his abdomen. He lies on his right cheek, the right arm is extended, the left arm is flexed, the patient's left hand being placed by his left cheek. Fluoroscopy in this direction usually tends to displace the stomach slightly upward. This position, however, gives a splendid view of the lesser curvature side of the cardia. A few plates are made in this position and labelled with the word "prone". Next we elevate the left hip of the patient, at the same time flexing his left knee so that part of his weight rests on the inner surface of the left knee. This gives a beautiful visualization of the lower two-thirds of the stomach as well as the cap and the second portion of the duodenum. This is the position in which we make most of the plates. Before making plates in the prone or in this last described position, which we term the prone-oblique position, a hard flat pillow is placed under the patient's chest and another under his lower abdomen. This removes spine pressure from the stomach and is essential if good plates are to be obtained.

We then sketch out the shadow of the stomach on the patient's back with a skin pencil. This enables the technician accurately to cover the anterior stomach and cap as well as the second and third portions of the duodenum on an 8x10-inch film. By following this procedure exactly, the cassette can be slipped under the abdomen without moving the patient and we are then assured of maintaining a constant relationship between the tube, patient and plate throughout the entire series of plates. The importance of not moving the patient in the slightest will be appreciated in the attempt to visualize small lesions, as even the slightest increase in rotation of the patient between exposures can be sufficient to rotate the lesions out of profile and leave the physician in doubt as to whether a lesion is present or not. Needless to say the patient must have abstained from all food for six hours preceding the examination.

The films being completed, the patient is requested to abstain from all food and report six hours later at which time a fluoroscopic examination is done to reveal whether the stomach is empty, and if not, the degree of gastric retention present.

The prone plates are now placed in one pile and the prone-oblique plates in another.

Let us now for a few moments confine ourselves to the stomach side of the pyloric sphincter and consider the cap or first portion of the duodenum later. Let us remember that the X-ray shows us the inside and not the outside of the stomach. Naturally, the earliest signs of ulcer will be visible on the mucosa, as an ulcer starts as a mucosal erosion. When a localized area of the mucosa is destroyed barium fills this area and a crater becomes visible. If only the mucosa is involved this crater will not be constant on the plates as it will change location as it travels with the peristaltic wave. Very few ulcers are seen in this early stage. Within a few weeks, or even days, after the onset of symptoms the ulcer has spread from the mucosa to the muscular coat. From this time on the crater remains constant in location on all the plates made from that particular angle, whether it be from the prone or prone-oblique position. When the ulcer has persisted for several months, an area of induration develops around the crater. This area of induration or leucocytic infiltration always has the crater at its central portion. This factor is extremely important as it is one of the main differential points between benign and malignant ulcers. The crater of a malignant ulcer is practically never centrally located in its surrounding malignant induration.

The crater of a benign ulcer is smooth, clean-cut and rounded. The crater of a malignant ulcer is ragged, poorly-defined, and irregular. Benign ulcers occur in the ulcer-bearing area, that is, that area along the lesser curvature of the stomach from the cardia to the pylorus extending only a short distance over on the anterior and posterior walls of the stomach. Malignant ulcers may occur in any portion of the stomach. The safest differential point between benign and malignant ulcers is the end-result of three weeks rest in bed under the Sippy regime. The crater of a benign ulcer will almost in-

variably disappear in this length of time. Conversely, the crater of a malignant ulcer will show no change in this period of time.

Gastric ulcers are easy to recognize by X-ray examination and have to be differentiated only from malignant ulcers. Duodenal ulcers which are much more common are much harder to recognize early. This is due to the fact that the ulcer-bearing area of the cap, instead of existing only along the lesser curvature side where they can be easily recognized in profile, completely encircles the cap. Consequently, the majority of duodenal ulcers occur either on the anterior or posterior wall of the cap. This makes the visualization of a filled crater extremely difficult. They are best visualized on the partially filled cap, when the fleck of barium remains behind as the cap empties itself. If sufficient plates are made, the filled crater, which after all is the only positive X-ray finding of active ulcer, can practically always be seen on some of the plates. If the crater is sufficiently large, it can be identified on all the plates.

HEALING OF ULCERS

When a gastric ulcer heals, its deformity disappears entirely. If the original ulcer was large there may be some fore-shortening of the lesser curvature in its previous location, but, except for this the stomach wall shows no residual deformity. Most duodenal ulcers, however, leave a rather marked amount of cicatricial contraction which results in a permanent deformity which encroaches on the lumen of the cap. Should a recent ulcer occur in such a deformed cap, the recognition of its crater is difficult and often impossible.

Generally speaking, one can by X-ray examination always determine the absence or presence of an active gastric ulcer. Conversely, in a cap deformed by an old healed ulcer one has frequently to resort to the absence or presence of clinical symptoms, to determine whether a recent, active duodenal ulcer is present or not, in the event that a filled crater cannot be demonstrated on the plates.

There are only a few things which can be confused with peptic ulcer on the X-ray plate. Gallbladder adhesions involving the cap may be difficult to differentiate from a healed duodenal ulcer, but not from an active one. Extensive gallbladder adhesions may resemble a scirrhus carcinoma of the stomach, but does not in the least resemble ulcer. Benign tumors of the stomach may be confused with polypoid carcinoma, but not with ulcer.

In closing, I want to stress again one point. When one is in doubt as to whether a gastric ulcer is malignant or benign, the best interest of the patient is always served by a second examination after three weeks of rigid Sippy treatment with rest in bed. The second set of plates will always give as much as or more information than inspection and palpation of the exposed stomach. When we consider the high mortality of gastric resection, and how few even early carcinomas of the stomach are cured by radical surgery, I believe the three weeks trial on medical treatment is always justified.

Infantile Cerebral Palsy*

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THE nervous system is a complicated structure, about which information is neither exact nor complete. The control of motion is, however, one of its better understood functions; a considerable knowledge has been gained both from certain diseases in man and from experimental lesions produced in lower animals.

The bare act of motion, depending upon muscle contraction, is an exceedingly simple mechanism, requiring only an intact reflex arc. This consists of an anterior horn spinal cord cell, its efferent fiber to a muscle bundle and an afferent fiber leading back to the cord. The orderly and purposeful regulation of this motion, however, depends upon control of the spinal cord cell by structures higher in the nervous system, in the spinal cord, in the brain stem and in the brain.

It has always been taught that paralytic motor lesions are of two types, the lower motor or flaccid type, and the upper motor or spastic type. It is true that destruction of the lower motor neuron or anterior horn cell of the spinal cord always results in flaccid paralysis, a complete abolition of motion of the muscle supplied by that neuron. Destruction of the upper motor neuron or brain cell, however, presents an entirely different picture, a perversion, rather than an abolition, is the result. Furthermore, we need only consider some of the various clinical disorders of perverted motion to conclude that the upper motor neuron is a complicated and not easily defined structure.

A familiar picture in the adult is the spastic hemiplegia resulting from cerebral hemorrhage in the patient with hypertension and arteriosclerosis. Here there is destruction of the motor cortex of the brain or some part of the pyramidal tract arising from it, giving a characteristic stiffness and loss of function of the muscles supplied by the damaged tract.

In Parkinson's Disease, or paralysis agitans, we observe a disorder where there is little actual loss of motion, but there is an uncontrollable tremor along with muscular rigidity and loss of associated body movements. It is believed that the condition results from disease of the basal ganglia, nuclear structures situated deep in the tissue of the cerebral hemispheres.

The tumor or destructive lesion of the cerebellum gives typically a syndrome characterized by hypotonus, ataxia and incoördination.

From these and various other observations it is concluded that the orderly control of muscular activity depends upon the integrity of several distinct parts of the brain. (Figure 1.) Insofar as we are concerned, these

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CONTROL OF MOTOR ACTION	
Part of Nervous System:	Function:
Motor cortex	Voluntary motion
Basal ganglia	Associated movements—Posture
Cerebellum	Muscle tone—Synergy
Vestibular apparatus	Equilibrium
Spinal cord cells	Reflex motion

Figure 1.

are principally: (1) The cerebral cortex which controls voluntary motion; (2) The basal ganglia which control associated movement and posture; (3) The cerebellum which controls balance, muscle tone and muscle coördination. Without respect to connections within the brain, these systems may be graphically represented. (Figure 2.)

It is of the utmost importance to keep these facts in mind in considering any disorder of motion of intracranial origin.

A final word in introduction concerns the mental property of the brain. Although located in the same organ, the function of thought and the control of motion are not identical activities. Both may be involved by a single disease process, or either one may be preserved intact. From this very sketchy groundwork, gleaned mainly from observation of the adult organism, let us see if there is anything of value which may be used to understand the very great problem of the child with a disorder of its motor system. We speak of such a child as being spastic, or having spastic paralysis. Little's Disease also is a commonly used term. Lately the disease has become popularly known as cerebral palsy.

Cerebral palsy may be defined as a disturbance of motor function due to damage of the brain, occurring before, during or after birth. A few children have a maldevelopment of the central nervous system from congenital causes; a small number in the group are added from injury and infection occurring after birth; however, in general, accidents occurring during labor are by far the most important single cause of the disorder.

The most obvious immediate statement that can be made regarding the child as distinct from the adult is that we are dealing with an organism which in the normal course of events is a growing and developing structure. Damage to brain tissue is irreparable, nevertheless the developing organ has tremendous powers of adaptation and substitution of intact portions for those parts damaged. In spite of this tendency and power of adaptation and substitution, the fundamental fact remains that various parts of the child's brain have different functions in regard to the control of the act of motion. These may again be stated as:

- (1) The cerebral cortex through the pyramidal tract controls voluntary motion.
- (2) The basal ganglia through the extrapyramidal tracts control associated movement and posture.

(3) The cerebellum controls balance, muscle tone and muscle coördination.

Damage to the brain should result in a disorder of motion according to the part damaged. It might be supposed that a lesion affecting any part of the brain would be widespread enough to affect other parts and thus give clinical pictures differing only in degree of the various components of the motor disorder. As a matter of fact, it is now apparent that the lesions causing infantile cerebral palsy are quite sharply restricted, and very little mixing of disturbed function occurs. Upon the recognition of this fact, rests the entire understanding and the care and treatment of the child afflicted with this disorder.

Significant lesions of the cerebellum are rare and for all practical purposes may be disregarded.

Destruction of the motor cortex results in the pyramidal tract syndrome, characterized by spasticity and impairment of voluntary movement. All extremities may be involved, or the lower only, or there may be a hemiplegia. In the individual the clinical picture is relatively fixed and unchanging. There is a tendency for strong adductor contraction, giving the typical "scissors gait." The strong extensors overpower the flexors and the patient tends to walk on his toes. In the upper extremity, the arm is held tightly to the side with the forearm pronated and the wrist and fingers flexed. There is usually little disturbance in speech, which, where present, has a fixed and stereotyped defect.

In contradistinction to this picture is the extrapyramidal tract syndrome due to destruction of the basal ganglia. Rigidity, tremor and athetosis are the outstanding characteristics. The more severe cases show chaotic, sometimes violent, writhing, irrelevant movements. The muscles of the face, tongue and throat are usually involved so that the patient grimaces, drools, has difficulty swallowing and often finds speech difficult of accomplishment. The rigidity is often mistaken for spasticity. It is to be noted, however, that the part of the brain controlling voluntary motion has been preserved; planned motion is hampered by the involuntary uncontrolled motion. The rigidity is an attempt to quiet the involuntary motions. All symptoms disappear during sleep.

We have then two disorders of the motor system, superficially similar, yet so entirely different in concept as to render treatment quite ineffective, unless the true condition is recognized. On the one hand we have a disease of the pyramidal tract, marked by spasticity and actual loss of planned voluntary motion. On the other hand, we have a disease of the extrapyramidal system, marked by athetosis and uncontrolled movement with no real loss of voluntary motions. In the individual the differentiation is sometimes most difficult. It can probably best be arrived at by fixing in mind the properties of true spasticity, recognized by certain standard criteria. (Figure 3.)

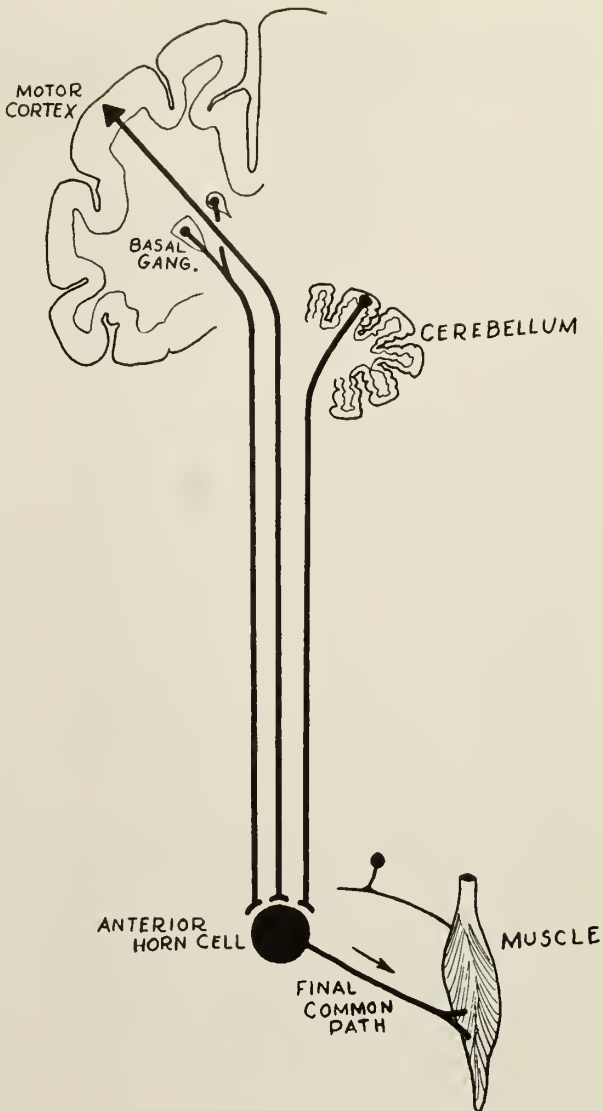


Fig. 2. Main Motor Paths.

DIAGNOSTIC CRITERIA IN SPASTIC PARALYSIS

I. Muscular Paresis or PARALYSIS

Selective impairment of voluntary movement. Loss of skilled and isolated motions.

Upper extremity: supination of forearm, extension of wrist and fingers.

Lower extremity: dorsiflexion of foot and toes, abduction of thigh.

II. Release Phenomena

Muscular hypertonus or **SPASTICITY**.

CLONUS.

INCREASED TENDON JERKS.

Associated movements and tonic reactions of labyrinthine and muscular origin.

Flexion reflex of lower limb, including **BABINSKI** response.

Figure 3.

If, then, we compare the two disorders critically with regard to all of the phenomena observed clinically in cerebral palsy, the difference becomes much more apparent. (Figure 4.) It is only now that treatment of the child with cerebral palsy can be intelligently planned.

COMPARISON OF SIGNS IN PYRAMIDAL AND EXTRAPYRAMIDAL SYNDROMES		
	Pyramidal	Extrapyramidal
Loss of voluntary power	Marked	Slight
Selective hypertonus	Upper extremity flexors. Lower extremity extensors	Less marked. General flexor predominance
Passive stretching	"Clasp knife" effect	Equal tension throughout
Shortening and lengthening reaction	Present	Absent
Clonus	Present	Absent
Tendon jerks	Increased	Normal
Cutaneous reflexes	Diminished	Increased
Sign of Babinski	Present	Absent
Associated movements	Present	Absent
Tonic reflexes of Magnus and DeKleijn	Present	Absent
Involuntary movements, tremor, athetosis	Absent	Present
Fixed contractures	Frequent	Develop slowly

Figure 4.

Let us consider, first, the true spastic suffering from the injury to the motor cortex or some part of the pyramidal tract. The most rudimentary of voluntary motions is often seriously interfered with and must be taught. This is accomplished by muscle training, by repetitive performance of a motion, seeking to make the most of the intact residue and at the same time hoping to adapt or substitute some other part of the brain for that part which has been damaged. Voluntary motion is impaired and can be regained only by patient training.

On the other hand is the extrapyramidal type suffering from no loss of voluntary control, but afflicted by involuntary motions which block attempts at voluntary motion. In sleep the involuntary motions disappear, as do they to varying degrees with any method of relaxation however induced. Voluntary control is then found to be present. Obviously, it is unnecessary to teach this child voluntary motions. In fact, the attempt to do so often makes the child worse as he becomes more and more tense in an effort to control and break through the involuntary motions. Once he has been taught relaxation, the voluntary motions which are present can be gradually brought into use. Surgery is of considerable value in the pyramidal type with a fixed spastic deformity, because it often places a part in a much more

effective position from which to begin muscle training. On the contrary, surgery is frequently disappointing and often a dangerous procedure in the extrapyramidal type, because the result is often unpredictable and sometimes merely the reverse of the original deformity.

The principles of treatment may be briefly summarized. (Figure 5.) A few general principles might be

PRINCIPLES OF TREATMENT OF CEREBRAL PALSY	
Pyramidal Type	Extrapyramidal Type
Muscle Training: Substitution and adaptation of intact cortex. Voluntary exercises to acquire reciprocal action of antagonists. No passive exercises. Stretch reflex defeats aim. Rhythmic games. Timing according to motor sequence. Alternation of legs early. Skilled motions late. Surgery: Tendon lengthening. Neurectomy. Muscle transplant. Stabilization.	Relaxation: Involuntary motions disappear on relaxation and in sleep. Voluntary motions present. Muscle training little value. Acquire purposeful and coordinated motions as involuntary motions abolished. Relaxation by conscious acquisition or induced by massage. Surgery: Peripheral surgery of little value except in persistent deformity. May result in opposite deformity. Myelotomy reduces severe athetosis.

Figure 5.

mentioned in regard to the care and treatment of all children afflicted with cerebral palsy. The normal child is endowed from birth with certain changing patterns of development. He sits up at six months, creeps at ten months and stands alone at fifteen months. This presupposes that there is an optimum time for the acquisition of each pattern. This should be followed as well in the child with cerebral palsy. It is easier to teach walking at eighteen months than at five years, when the child is heavier and the urge for walking has been discarded. Complex and skilled motions should not be taught until the rudimentary ones are conquered. Treatment should be started as early as possible. Gross motions can be taught at an early age and the value of relaxation also learned by the small child. Early treatment eliminates the necessity, when the child is older, of unlearning bad habits acquired in infancy. Passive exercises are useless. The child's cooperation must be enlisted.

Many of the children afflicted with cerebral palsy have sufficient intelligence to warrant a considerable expenditure of time and thought in trying to do something for them. The determination of mentality is an exceedingly difficult procedure because the standard tests are largely based on motor activity. The pure inability of the child with cerebral palsy to communicate with the normal person is no reason to discard him unless gross defects in mentality can be unequivocally proven.

Cervical and Vaginal Pathology and Treatment*

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LIKE other parts of the body, the lower genital tract of the female may be the site of various abnormal conditions. Also, because of its particular functions in reproduction and its intimacies to the urethral and anal orifices, it suffers mechanical, bacterial, and chemical irritations and insults foreign to other body structures. The lower genital tract includes the vulva and the vagina, certainly, and perhaps the cervix. All three of these may be involved simultaneously or individually by certain disease processes, while other pathological entities and abnormal states may be limited to only one or two of them. Only some of the more common or interesting lesions are discussed here.

The employment of gynecological complaints or symptoms for diagnoses is unjustified ordinarily. The word, pruritus, is no exception and when so used implies diagnostic error if not ignorance. Moreover, discharge is either a symptom or finding, not a disease. Vulvovaginal discharge is no more normal, menstrual and lochial flow excepted, than a so-called "running nose" or a "draining ear." Moisture sufficient to keep the mucous membranes pliable is physiological, but this should not be profuse enough to annoy the patient or soil her garments. A common lay opinion is that married women, and especially mothers, may have "whites" as a normal condition. Discharge in the premenacmic (pre-adolescent) individual, just as in her mature sister, is likely evidence of an infection or inflammatory reaction in the vulva, vagina, or cervix. Pruritus of gynecological import is almost always limited to the vulva and the vaginal orifice, whether it results from mechanical or chemical irritation, bacterial action, or neurologic lesions. Less commonly vulvar pruritus is a referred symptom.

VULVAL DISEASE

Bartholin's cyst, Bartholin's abscess, chronic atrophic dermatitis (Adair and Davis) or kraurosis and mycotic or diabetic vulvitis will constitute the entities of this section.

Bartholin's cyst is an enlarged vulvovaginal gland, almost invariably distended by a clear, transparent or slightly cloudy serous or mucous-like fluid. This is located at "5 and 7 o'clock" just outside the hymenal ring. It forms because the duct has become occluded. Previously these cysts were considered pathognomonic of an old gonorrheal infection, but not so nowadays. The normal gland is not palpable, yet it is capable of undergoing marked distention, even to fill the entire labium majus. The overlying skin remains normal in color without evidence of inflammation. The mass transmits light, but gives no impulse on straining or coughing and is dull on percussion. Tympany indicates gas and, therefore, probably a hernia, especially if one elicits an impulse on coughing. Opacity to light suggests hematoma, vari-

osity, neoplasm, etc. Inflammatory reaction indicates the presence of an infection which is often a suppurative process. Malignancies and other neoplasms of this site are quite uncommon.

The treatment of Bartholin's cyst is excision. The mucosa should be incised at the mucocutaneous junction or well within the introitus and reflected back. Finally the intact sac may be enucleated by clamping the base to avoid severe bleeding. Curtis recommends incising the sac after it is moderately well freed from the surrounding tissue, grasping the base from within, and then severing it from the base. Some aspirate the contents and replace with melted paraffin which solidifies at body temperature. If it is cut accidentally, it does not collapse. Unless the sac is completely removed, the cyst may reform. Serious blood loss may occur due to the vascularity of the region.

Bartholin's abscess should present the typical evidence of any abscess. The treatment is adequate drainage. An incision on the mucous membrane surface is a better location for occasionally a sinus results. The cavity should be packed loosely for a few hours and the skin edges kept apart until it has healed from the bottom up.

Kraurosis or chronic atrophic dermatitis occurs as a rule after the menopause. Essentially it is a disease of the squamous epithelium and involves the area from the hymenal ring laterally to and even beyond the labium majus, and may even encircle the anus posteriorly. It begins usually between the labial folds, about the clitoris, or posteriorly in the fourchette and on the perineum. Early, there is a false hypertrophy, the result of edema, hyperemia, and injection. The epithelium loses its normal healthy appearance to assume gradually a grayish white, somewhat leathery structure. The folds between the labia and about the clitoris vanish or become agglutinated. One may notice areas of breaks in the surface, perhaps the result of scratching. The late or third stage is typical of advanced atrophy with inelasticity and a smooth epidermis with possible leucoplacic areas. Carcinoma is a likely complication late in the course of the disease. Mycosis or diabetes vulvitis may be confused with this clinical entity. In the absence of diabetes mellitus and positive cultures or smears for fungi, one will not likely err in diagnosis. X-ray therapy has been employed, but it will not always cure nor prevent the development of carcinoma. Taussig, and Adair and Davis advise surgical removal. The entire diseased area with the entire thickness of skin must be removed completely. When all the perianal epidermis is involved, a two-stage operation is advised. The usual procedure is to leave a bridge on either side of the anus. These two areas are removed when the incisions above and below have healed. Even though it is after the menopause, the danger of excessive blood loss prevails. Those patients who are poor operative risks with short expectancy might be treated by X-ray, but in other circumstances such therapy is

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contra-indicated. Some can be operated upon successfully under heavy narcosis and local anesthesia. Adair and Davis found hormone therapy unsatisfactory. The complete removal of the diseased area should ensure cure and is the best protection against malignancy.

A yeast-like organism, a *Monilia* (medical), is the etiological agent of *diabetic* or *mycotic vulvitis*. The term, *diabetic*, arose because this type of vulvitis was associated usually with uncontrolled diabetes. Our data show convincingly that it is the fungus which actually causes the disturbance. In 57 diabetic patients with vulvitis, with the typical clinical picture, all but three yielded the fungus on culture. These three had been treated locally and were not available later for reculturing. On the other hand, only five of 40 uncontrolled diabetic women without vulvitis had these organisms. For evidence of pathogenicity, one needs only to refer to the work of Plass and his co-workers. The term, *diabetic vulvitis*, is incorrect and misleading. The vulva is usually hyperemic and slightly edematous, tender to touch, and may have petechial-like areas. Yet if the condition has persisted for any period, there may be evidence of tissue change quite similar to that of kraurosis. Abrasions may be noted, probably due to scratching. Vulvar pruritus reaches its peak in chronic atrophic dermatitis and mycotic vulvitis. The confirmatory diagnosis is made by finding the buds or conidia in smear or by obtaining a positive fungus culture (Sabourraud's medium).

The treatment is medical. The diabetes should be controlled and local mycotic therapy instituted. (See below under vaginal mycosis.) X-ray and surgery are certainly contra-indicated. A one per cent aqueous gentian violet solution applied locally daily or every other day gives surprisingly good results. Dilute Lugol's solution is also effective and it is the treatment of choice for some. According to Hesseltine and Hopkins, douches are disappointing. Lysol solution is of questionable value. Bichloride of mercury 1:2000 may be advised, but one faces the risk of mercurial reactions and poison.

VAGINAL DISEASE

Aside from infection and inflammatory reactions of the vagina, relaxation and traumatic injuries are the only other real common disorders. The former group, the infections and inflammatory reactions, have less therapeutic and diagnostic uniformity than the latter and are the only conditions for consideration in this section. The adult female has commonly trichomoniasis, mycosis, senile vaginitis, and reactions to foreign bodies and chemical irritants.

Normally the adult vagina is moist. The formed contents of the moisture should be almost entirely epithelial cells and vaginal bacilli except at, during, and immediately after menstruation or during the puerperium. Other cellular structures are unusual and other bacteria in any number are abnormal. Although there may be some cyclic change in the vaginal epithelium, it remains elastic, smooth, soft, and moderately thick. The vaginal acidity is most pronounced in health and becomes less acid in practically all abnormal conditions, sometimes almost alkaline. The epithelial cells of the vagina contain glycogen-like material which serves as a source of

food for the acid-producing bacilli. Extreme acidity prevents the active growth of most other bacteria.

Since gonococcal infections in the immature female cannot be completely and adequately discussed in such a short interval, only some of the more pertinent facts will be mentioned. It is limited usually to the vulva and vagina, but in some instances, a favorable nidus is found in the urethra, rectum, and even the undeveloped cervix. For some reason this infection spreads easily in nurseries and pediatric wards. Foreign bodies and chemical irritants may give a similar clinical picture. One may make a positive diagnosis only by identifying the organisms in smears or cultures. These patients should be segregated from other girls to prevent spread of the disease. At present, the best cure appears to result from the administration of estrogenic hormone. The principle is to produce an adult type of vaginal epithelium which is associated with an increased vaginal acidity. The organisms die off, presumably because of an unfavorable environment. Infection in the urethra, cervix, and rectum is not influenced by hormonal therapy. Te Linde recommends 75 rat units of estrogen daily in vaginal suppositories. His cures occurred from 14 to 59 days. There may be changes in the breasts.

Reports indicate that sulfanilamide may be used successfully in girls. If the reports are confirmed, the dosage is computed by ratio of weight of child to average adult in proportion to the adult amount. The potential dangers of the drug must not be forgotten.

Vaginal trichomoniasis is a distinct clinical entity found more often in the reproductive years of womanhood and quite rarely in the child. The discharge is copious, usually yellowish, contains gas bubbles, and may appear frothy with a somewhat pungent and mildly putrefactive odor. It is composed essentially of pus cells, practically no epithelial cells, a mixed bacterial flora (type 2 or 3) with a preponderance of gram negative and gram positive cocci, few or no vaginal bacilli, and the vaginal trichomonads. The trichomonad is about the size of a pus cell and possesses four anterior flagella and a posterior flagellum. Its characteristic motion can be observed under low or high-dry magnification. Others, less experienced, prefer oil immersion microscopy. Whether or not the flagellate or some associated bacteria are pathogenic, the clinical entity is characteristic. The vaginal walls are prone to be stippled with minute reddened areas, especially about the cervix. The vaginal epithelium may appear rough or granular to the examining finger. Pain or tenderness in the vagina causes a moderate vaginismus.

The treatment of vaginal trichomoniasis consists of (1) preventing reinfection and (2) curing. Allen, Jensen, and Wood demonstrated the importance of the patient's own urethra and bladder as a site of reinfection. Cornell and Riba, Adair and Hesseltine, and others presented evidence that the organisms may be carried in prostatic secretions. The controversy over the rectal source still waxes and wanes. Prevention of reinfection during treatment consists of eliminating all sources of infection. The patient is instructed about anal hygiene, advised to force fluids, and, if after a reasonable period

has not improved, is given ammonium chloride 1 gm. (15 gr.) three times a day for many days with forced fluids. Sexual rest is prescribed, but if such cooperation is lacking, condoms must be employed. If after cure a recurrence follows normal copulation, an urological examination of the male is indicated.

The curative treatment consists of daily insertion of plain lactose tablets 1 to 2 gm. (30 to 60 gr.) upon retiring. This material may be dispensed in gelatin capsules or tablets. All douches are eliminated. Roblee uses beta lactose instead of the regular (alpha) lactose. The carbohydrate is a replacement for the deficiency in the inflamed vaginal epithelium. As improvement occurs, the carbohydrate may gradually be decreased. Devegan seems to give the same result because it is a carbohydrate, and the arsenical compound in it does not increase its effectiveness. Silver picrate preparations give the same results apparently by the action of the kaolin powder and the gelatin and glycerin suppositories. The drug is unnecessary and occasionally produces toxic reaction. Merthiolate suppositories will give results more from the vehicle than from the drug. The reports of Hesselatine throw considerable doubt upon the value of any agent other than that which directly favors the normal restoration of the vaginal epithelium. Occasionally, when there is sufficient improvement, a mycosis will develop, but this can be cleared promptly by mycotic therapy after discontinuation of the lactose treatments with the result of cure. Some patients require treatment for periods of weeks while others are cured quickly. The old chronic cases are more resistant to any therapy as a rule. A patient should not be considered cured until two complete menstrual cycles are completed without recurrence.

Vaginal mycosis is caused by the same fungus as vulvar mycosis. The one constant uniform symptom is vulvar pruritus. There are thrush patches or caseous material scattered about the vaginal walls. There may be some hyperemia and some tendency to bleed when the material is wiped away. Vaginal mycosis occurs most often in pregnancy. Unless the patient is cured the baby may develop thrush through contamination at or shortly after birth. There is no typical histo-pathological picture of the vaginal wall.

The treatment consists of liberal applications to the vaginal wall and vulva of one per cent aqueous gentian violet, three times a week or using one-fourth strength Lugol's solution in the same fashion. At the Chicago Lying-in Hospital and the University of Chicago Clinics, a dilute Lugol's solution is used weekly and each night the patient inserts one or two capsules containing a mixture (0.125 to 0.25 gm. or 2 to 4 gr.) of potassium iodate and potassium iodide (1 to 6.2 ratio) in kaolin neutralized by ammonia vapor. The acid in the vagina completes the reaction to liberate the element, iodine. Elemental iodine is the most potent fungicide clinically usable.

Senile vaginitis develops in individuals after physiological or artificial menopause. It is due to an infection upon a shallow atrophic vaginal epithelium probably by a coccus. In the early stage there are multiple hemorrhagic areas or bleeding points, moderate tenderness, and

an inelastic mucosa, relatively free from folds. Later the denuded areas may become sites for adhesions between the walls. Some clinicians recognize this condition as adhesive vaginitis. Actually it is a healing process. That inflammatory reaction occurs under the epithelium is well established by biopsy study (Adair and Hesselatine). Manipulation may cause pain and may start bleeding.

The superficial appearance may resemble at times that of trichomoniasis. The discharge is scanty and not frothy. Trichomonads are not present. On the other hand, the cellular and bacterial flora are very similar to that of trichomoniasis. If these protozoa are present in any number, then it is probably a trichomoniasis. Successful therapy restores a normal vaginal epithelium. Sexual rest is of paramount importance, but alone is inadequate. Davis prescribes not more than 100 rat units of amniotin three times weekly and a vaginal suppository of 75 rat units each night. Subcutaneous therapy alone may suffice and so may the vaginal suppositories in certain patients. This causes a pronounced increase in the size and number of the cells of the vaginal epithelium and thus supplies an abundance of carbohydrate. Treatment should be continued until all evidence of disease has been absent for at least one week. With withdrawal, the mucosa returns to the postmenopausal atrophic state but not to the lower disease level.

Equally good results follow application of plain lactose tablets or capsules. This corrects the deficiency of the vaginal carbohydrate by direct means and must be supplied until completely cured. Its advantage is its economy and simplicity.

Foreign bodies in the vagina or cervix cause discharge, perforate by pressure necrosis, as well as cause a focal site for infection. Proper management necessitates removal.

CERVICAL DISEASE

Lesions of the cervix for consideration include erosion and Nabothian cysts, lacerations, stenosis, hypertrophy, infection, and polypi. Carcinoma is mentioned only in differential diagnosis for it alone is too broad a subject for a few minutes discussion. In 1910, Adair published a classic description of *cervical erosions*. The junction of the stratified squamous and columnar epithelium should occur at the external os. The columnar epithelium may extend out onto the vaginal surface due to development or to replacement in loss of surface epithelium. The cervical epithelium possesses gland-forming units. The occlusion of the ducts by inflammation or overgrowth by squamous epithelium causes the development of Nabothian or cervical glands. Laceration may favor eversion of the cervical lips and canal. This exposes the columnar epithelium to insults. A portal of entry for pathogenic and infectious organisms prevails at these unhealed areas. Descriptions of erosion, Nabothian cyst, and laceration are intentionally eliminated.

Primary *gonococcal infections* in the adult involve the urethra, Bartholin's glands, vagina, and cervix. The vaginal infection is of short duration and of probably little consequence. Infection of Bartholin's glands may result in abscess formation, but may subside without

much change. Urethritis and cervicitis constitute the two major points for diagnosis and treatment. As long as the infection remains localized, serious damage to the patient does not occur. Diagnosis is made only by recovering the gonococcus from the urethra and/or the cervix in smears or cultures. Cures are recognized only after three consecutive negative smears and cultures from all infected sites are obtained.

Enthusiasm waxes still over the curative effects of sulfanilamide. At the Chicago Lying-in Hospital and the University of Chicago Clinics, smears tend to become negative fairly promptly, but in one-sixth of the group, cultures have remained positive for varying periods, upward to seven weeks longer. Greater care is needed in smear examination for accuracy when sulfanilamide is used. The patient may lose all symptoms and even appear cured, but remain infected. A few cases of salpingitis were not benefited by sulfanilamide therapy. A moderate incidence of toxic manifestations of the drug have been reported. The dosage for the first two or three days is 10 to 15 gr. (0.6 to 1.0 gm.) five times daily at four hour intervals. This amount is too large in the presence of impaired kidney function. Beginning with the fourth day, the amount is progressively and gradually decreased over a period of two to four weeks or longer in obstinate cases. Every patient under this treatment should be observed carefully and frequently for complications, and for exacerbation of apparent cures. Whether it is safe to use in pregnant women is not proved. In the experimental animal (the rabbit), the unborn tolerate the drug less well than the mother, so it seems. The same certainly prevails for the lactating women, as the drug is excreted in the milk in greater concentrations than it occurs in the blood. Best results follow early institution of treatment, proper safe dosage, elimination of all other drugs, and frequent, careful observations.

Foreign bodies, such as cervical or stem pessaries, are dangerous as more damage than good may result through perforation, pelvic abscess, and other pelvic infections.

Cervicitis and *erosion* tend to continue for an indefinite period, often associated with pelvic lymphadenitis. Sensation of pelvic weight and backache are common. Such symptoms, sometimes associated with retroversion and prolapse, have disappeared completely and permanently by correction of the cervical pathology.

Nabothian cysts are not so readily treated by cauterization but may be. *Erosion* may be corrected by electric coagulation or cauterization. Our policy is to streak one lip at a sitting, not closer to a menstrual period than a week and only in the absence of adnexal infection. Since electric cauterization is distinctly contra-indicated in pregnancy, one may use silver nitrate (lunar caustic) sticks or solution or some other chemical. Conization has some merit, but should be done when the patient can be observed carefully for 24 hours and where surgical facilities are at hand to control hemorrhage should it occur. Cervical stenosis is a possible complication. Any procedure involving the cervix must be evaluated not only as local cure, but in terms of scarring and contracture. Severe *stenosis* obstructs uterine drainage and

causes sterility and dystocia. Infection alone may damage the cervix, but curative procedures should, as far as possible, avoid producing complications.

Extensive *cervical lesions* or *hypertrophied cervixes* may be treated better by amputation or trachelorrhaphy.

Some believe that extensive surgical operations on the cervix are contra-indicated because of the subsequent complications. When removal of the uterus is indicated for other reasons, total rather than subtotal hysterectomy is the procedure generally agreed upon in the presence of a diseased cervix. Total hysterectomy carries a slightly greater incidence of mortality, morbidity, and urinary tract injury, but it removes the risk of cervical carcinoma, a site of pelvic lymphadenitis and other complications associated with unhealthy cervixes.

Small pedunculated *cervical polypi* can be removed by torsion. The large ones should be ligated and excised. Ordinarily the presence of cervical polypi contra-indicates curettage because of the increased risk of serious or fatal infections spreading from the local site.

The frequency of cervical carcinoma and the great benefit from early therapy necessitate the exclusion of this disease whenever there is the slightest question. Adequate biopsy specimens facilitate in the differential diagnosis. Too often the specimens removed in the office are inadequate, fragmented, or are poorly chosen. Consequently a plea is made for proper biopsy specimens. Any lesion which bleeds on contact, does not take dilute Lugol's solution, has a papillary growth or any other suggestive changes should be studied histologically to exclude malignancy. One of the best ways to bring any good procedure into disrepute is to attempt to make it do more than it can. The result of cervical carcinoma depends upon early recognition and proper therapy. While patients seek relief primarily from symptoms, the dutiful physician renders a service for the future as well as for the present.

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Acute Pneumonitis or Atypical Pneumonia*

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SCADDING¹ in 1937 commented upon the fact that lobar pneumonia has been extensively studied and classified into the various bacteriological types while the clinically important atypical pneumonias remain largely unclassified. Bowen² in 1935, Allen³ in 1936, and Gill⁴ in 1938, in describing pneumonitis, likewise referred to the prevailing confusion. Allen described acute pneumonitis as "a form of respiratory infection characterized by a benign course, few physical signs, and roentgenologic evidence of a localized inflammatory process in the lung."³

Dismissing, for the purposes of this paper, such conditions as tonsillitis, sinusitis, bronchitis, and typical pneumonias, most of the respiratory tract diseases admitted to the Isabella McCosh Infirmary of Princeton University are classified either as common cold or gripe. Recognizing the difficulties and more or less unavoidable overlapping in some of these cases, we believe that for our purposes it is satisfactory to regard the student who has the well-known symptoms of the common cold as such, and to classify those having generalized body aching, higher fever, greater malaise, and little or no nasal discharge, as gripe. We use this classification synonymously with mild influenza. A review of the past ten years shows that while those cases diagnosed as "gripe" usually require a longer stay in the infirmary than those diagnosed as "cold", and while occasional complicating factors are encountered, we are generally justified in anticipating recovery within a few days, the great majority being able to resume work in less than a week or at most ten days.

Prior to 1933, pulmonary complications in our gripe cases were rarely discovered. This is in keeping with the report of Burgess⁵ of the March 1926 epidemic at Brown University; he found that the students at Brown, while susceptible to influenza, were very resistant to secondary pulmonary complications during that epidemic. In the fall of 1933 we became impressed by the fact that some of our so-called gripe patients did not show as prompt recovery as the usual patient so diagnosed and encountered in our service. The history of onset in these cases did not differ materially from those following the usual course. Physical signs of chest involvement were almost uniformly absent, although cough was persistent, but unproductive. Roentgenograms showed areas of increased density, usually involving a portion of one lobe, usually well defined but fading into normal parenchyma, and appearing to be an inflammatory process; this area did not, as a rule, extend to the periphery. Sixteen such cases were discovered among the ninety-two originally admitted to the infirmary as gripe. All recovered, and the course of the disease was similar in all cases, the average duration of fever being 8.3 days and

the average stay in the infirmary being 16.1 days. We wish to emphasize the statement that only by X-ray were we able to diagnose the condition, which we then classified as a bronchopneumonia, for want of a better description.

In 1934-35, only six such cases were discovered, although 149 patients were diagnosed gripe; and in 1935-36 only nine such cases were diagnosed while 236 were diagnosed gripe. We have purposely excluded from this consideration the lobar pneumonias and bronchopneumonias which could be diagnosed independently of X-ray.

In 1936-37, forty-seven such cases were seen, while the diagnoses of gripe numbered 256. Owing to the unusual number we undertook an analysis of these cases. The age range of our group, with one exception, was between 17 and 23. As the infirmary is primarily for students and Princeton admits no women students, all were males. The onset of the disease was usually sudden, and the symptoms on admission were fever, chills or chilly sensations, weakness, generalized ache, and unproductive cough. While a few complained of nasopharyngeal irritation, and others of sore throat, coryza as such was rarely present. Slight dizziness was mentioned by two, abdominal pain by one, and a feeling of tightness in the chest by two. These patients did not appear very ill and, except for slight injection of the pharynx in a few, physical examination was essentially negative. A purulent post-nasal discharge was noted in three and in only one case were fine crepitant rales and slight impairment of resonance noted over the involved area at the time of admission. Coarse rales were often heard after fever subsided and the patient was well on the way to recovery. The temperature remained elevated for an average of 7.7 days. The lowest maximum temperature was 99.8 and the highest maximum temperature was 104.2, the average maximum being 102.3. The accompanying charts show the usual type of temperature. Defervescence was always by lysis. The respiratory rate was usually normal or only slightly elevated, except in three cases, each of which had upper lobe involvement. It was seldom possible to secure sputum for examination and in only two cases were pneumococci reported, in both of which typing gave questionable results. The white blood cell count was only occasionally elevated above 10,000, the average being 9,616. There was no significant alteration of the differential count.

As to the X-ray findings, we cannot improve on Bowen's² description of similar cases in Hawaii. He described the condition as influenza pneumonitis and stated that the usual location was basal, involving only a portion of a lobe; that it had been seen in upper lobes and also in more than one lobe; that the extension was out-

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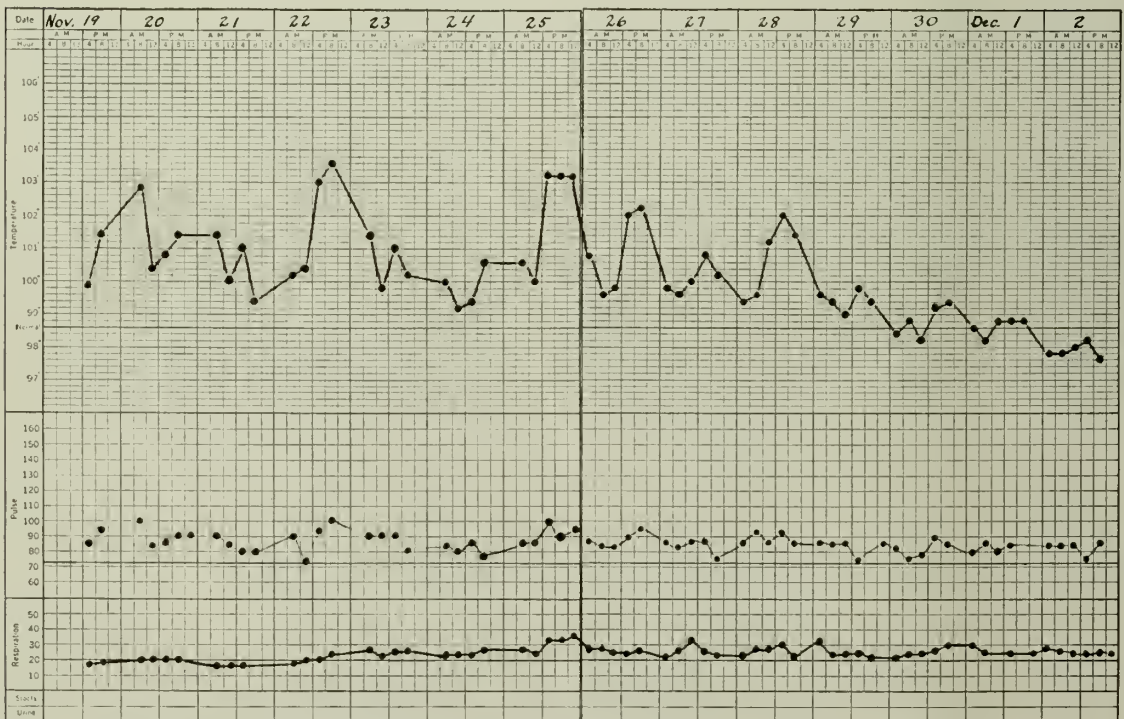
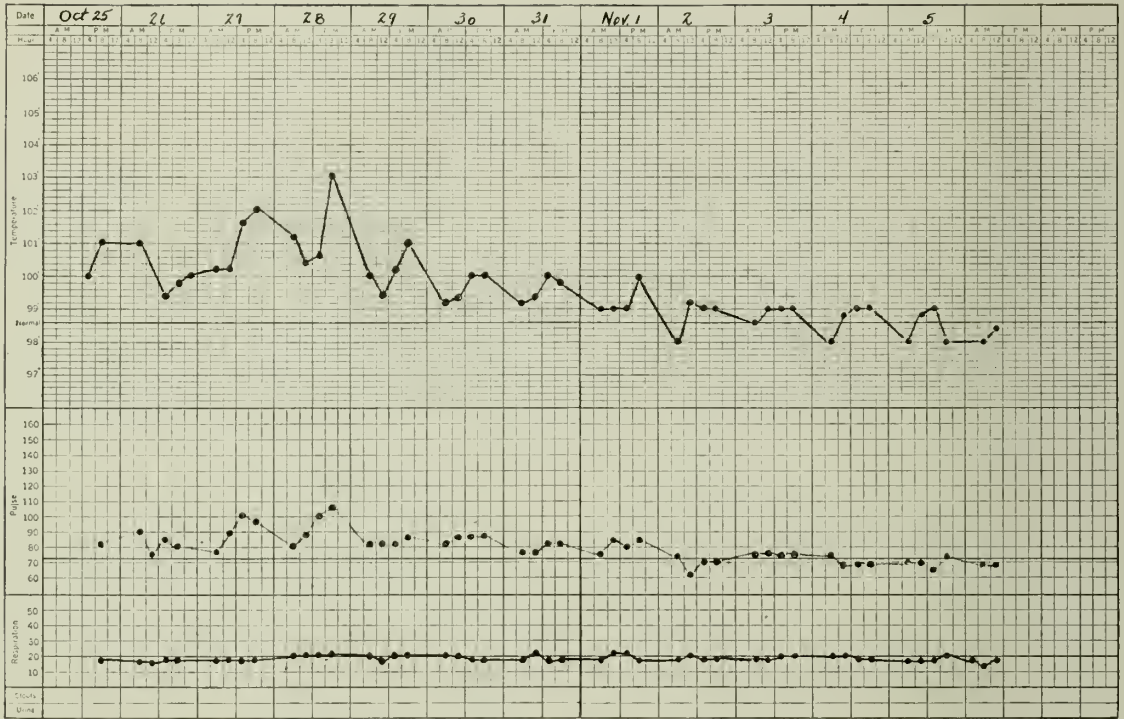


Fig. 1. Two charts illustrating course of temperature in two cases of acute pneumonitis.



Fig. 2. Pneumonitis right lower lobe.



Fig. 3. Pneumonitis right lower lobe.



Fig. 4. Pneumonitis left upper lobe.



Fig. 5. Pneumonitis right middle lobe.

ward from the hilus well into the parenchyma, and that it occasionally reached the periphery; that the X-ray appearance was "that of a confluent mottled fan, or rounded area, usually of homogeneous moderate density in the central portion with the borders fading into the normal lung"; that the appearance was "of an exudative alveolar infiltration and is usually more localized and of more even density than the bronchopneumonias of childhood or than those which complicate adult diseases." The same author further called attention to the fact that the usual scattered mottling of bronchopneumonia is not

limited to one lobe and not sharply localized. Table I shows the relative frequency of involvement of the various lobes. Resolution, as shown by X-ray, began in a few as early as the fifth day, while others required approximately ten days. The average stay in the infirmary was 13.4 days. In only one case was the convalescence prolonged by complications, maxillary sinusitis and otitis media requiring this patient to stay in the infirmary 35 days. No deaths occurred in any of our cases.

No specific therapy was employed except in one case, in which a questionable Type II pneumococcus was

TABLE I.

DISTRIBUTION OF PNEUMONITIS LESIONS IN 47 CASES

Right lower lobe	15
Left lower lobe	13
Right upper lobe	5
Left upper lobe	7
Right middle lobe	4
More than one lobe	3

reported. This patient was given combined Type I and Type II antipneumococcus serum without beneficial results. Indeed, we feel that the subsequent serum sickness prolonged the illness of this patient. Salicylates were used in moderation for relief of headache and generalized aching. Codein in small doses was of value for excessive cough.

COMMENT

We are not prepared to offer any evidence as to the etiological factor of acute pneumonitis. In most instances sputum was not obtainable; in a few for whom blood cultures were run, results were entirely negative. Neither the number of cases nor the data available justify an exact statement. In our search of the literature we have found only two papers describing cases which we consider similar to ours. These were by Allen³ and by Bowen.² Neither of these authors definitely established the etiological factor, but both expressed the opinion that it was associated with influenza, Allen assuming that a filtrable virus associated with secondary bronchial tract organisms was the causative agent.

Scadding⁶ believes that a pure influenza virus infection in the human can probably descend to any level of the respiratory tract and that if alveolitis occurs patchy consolidation is produced. He further stated that the influenza virus can produce such changes in the human lung as to facilitate bacterial invasion and that the variability of the factors of virus and bacterial infection can give remarkable possibilities in the clinical picture.

We believe that because of the similarity in symptoms of onset and the prevalence of grippé, or influenza, cases,

we are justified in assuming that it is probable that the influenza virus is responsible, either as a virus, producing alveolitis, or associated with secondary bronchial tract organisms. We suspect that the condition is much more common than is recognized, because of the necessity of X-ray evidence to establish the diagnosis. We can certainly state in answer to Bowen's question,² that the condition is not peculiar to Hawaii. We see no reason to believe that this is a new entity, but believe that more routine X-ray study of the chest in so-called grippé cases will result in its being recognized more frequently. The two reports previously referred to were both from Army services. Ours is from a university service. Whether the activities of military life or organized physical activities in students have any predisposing influence or not we, of course, do not know, but this would seem to be improbable.

SUMMARY

The term acute pneumonitis has been used in reporting 47 cases of atypical pneumonia seen at a university infirmary, recognized only by roentgenogram, occurring in young adult males, whose symptoms on admission were typically those of mild influenza.

The etiology has not been established but would seem to be associated with influenza.

The condition is probably more prevalent than is generally recognized, because of the necessity of X-ray examination in order to establish the diagnosis.

The prognosis in a group of this age and sex appears to be excellent.

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Essential Hypertension *

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HYPERTENSION is a term in common usage for a number of etologically distinct diseases involving the cardiovascular system. Discussion of its etiology and treatment is difficult because of the absence of basic facts upon which to build any definite theories. Is hypertension a definite entity due to a single cause, or is it, like a fever, merely a symptom? Is it a

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primary or a secondary condition? Is hypertension a compensatory measure? Is it due to a circulatory toxin, or a pressor substance in the blood such as guanidine; or is it a metabolic disturbance? Is it always due to pathology in the kidney? Does it cause, or is it the cause of arteriosclerosis?

Richard Bright, many years ago, knew that patients with kidney disease had a hard full pulse, indicating hypertension. In 1872, Gull and Sutton showed the im-

portance of arteriolar lesions in Bright's disease. A short time later the blood pressure apparatus was introduced and it was then known that high blood pressure and kidney disease occurred together. Later Clifford Allbutt of England and Janeway in America reported on a large group of individuals in whom hypertension existed but who had no evidence of kidney disease. This condition was called essential hypertension. From this time until the present, the idea became prevalent that all patients with high blood pressure did not necessarily have Bright's disease. However, there was quite a bit of confusion, and there still is, about the association of high blood pressure with arteriosclerosis.

The cause of essential hypertension was generally conceded to be a primary vasospastic disorder and the persistence of this functional condition over a period of years was thought to be the cause of the arteriolar sclerosis found in this disease. Some of the problems concerning this form of hypertension apparently were settled, the pathology accepted and the kidney excluded as a factor, when Goldblatt of Cleveland, doing some of the finest experimental work since the discovery of insulin by Banting and Best, was able to demonstrate that he could produce persistent hypertension in animals with all the characteristics of essential hypertension in man by the simple procedure of applying a silver clamp to the renal artery by means of which he accomplished various degrees of renal ischemia. Within a few weeks of the application of the clamp, a persistent hypertension followed which varied in direct proportion to the degree of renal ischemia. Vascular and organic changes were similar to those which result from essential hypertension. Vascular changes in the retina, arteriolar changes in the kidneys, hypertrophied heart, etc., were produced.

Evidence seems to indicate that some kind of a substance is liberated by the ischemia kidney which seems to act on the adrenals or pituitary glands and leads to hypertension. Recent study of patients with essential hypertension who have come to autopsy, have shown that the arteriolar disease in patients without hypertension does not affect the kidneys. The problem, however, is not settled. Clinical experiments have taught that certain measures are beneficial in allaying symptoms and retarding the progress of this serious and too frequent disorder.

In the study of diseases of the arterial system, considerable confusion has arisen on the terminology of the various clinical and pathological conditions, and it is, therefore, important to make clear the sense in which the various terms are used in this paper.

The following is a classification of hypertension:

1. Primary, essential or arteriospastic.
2. Malignant.
3. Nephritic.
4. Secondary.
 - a. aortic insufficiency.
 - b. coarctation of the aorta.
 - c. adrenal tumor.
 - d. pituitary basophilism.
 - e. hyperthyroidism.
 - f. pregnancy.
 - g. enlarged prostate.

HEREDITY

That heredity is an influential factor in hypertension is easily demonstrated, but that is merely a statistical fact which offers no scientific explanation. It is not known whether its influence is on the blood vessel, on the vasomotor mechanism, on the wall of the vessels or on the internal glands. When symptoms develop in essential hypertension, they are usually due, not so much to the high blood pressure as to the secondary changes in the arteries, heart and viscera. Attacks of vertigo, headache, tinnitus, dyspnea, retinal hemorrhages, hemiplegias and cardiac failure may all occur. Similar symptoms may also be present in arteriosclerosis without hypertension. A patient with essential hypertension may go for years without symptoms, often the condition being discovered on some routine examination.

The physical findings usually consist of:

1. High systolic and relatively low diastolic pressure.
2. Accentuated second aortic sound.
3. Enlarged heart.
4. Murmurs either in the aortic or the mitral areas.
5. Tortuous temporal arteries.
6. Changes in the retinal vessels.
7. At times evidence of edema, due to cardiac failure.

Early diagnosis is a matter of prime importance, because if treatment is to be of real value it should have its greatest effect in the functional stage, before organic changes have taken place. In fully developed cases with arteriosclerosis, the outlook as regards treatment is not so favorable.

The following physiological response of the cardiovascular system should be considered before treatment is instituted in elevated blood pressure: If a patient is placed at absolute rest, mental and physical, his blood pressure will drop to a level sufficient to maintain adequate circulation while living in this state. This pressure is called a basal pressure. Any form of external or internal stimulation, such as moving about, eating, drinking, excitement, worry, etc., will raise this pressure a sufficient height to maintain a sufficient blood supply if the circulatory apparatus is capable of responding. This is a normal physiological response occurring in all of us every minute of the day. It is not unusual for pressure to increase 50-75 mm. of mercury in normal persons because of some unusual demand. In pathological conditions of the cardiovascular system, this response to stimuli is greater than in the normal, because of the reduced caliber of the peripheral vessels.

GENERAL MEASURES OF TREATMENT

There is no specific treatment for hypertension. Treatment then, must be directed toward modification of such factors as vasomotor hypersensitivity and environment which have a decided effect on arterial tension. It should be obvious, therefore, that before one can treat this disease with any degree of intelligence, he should familiarize himself with the life and habits of the patient he intends to treat. It is frequently necessary to readjust the patient's whole life so he may secure more opportunities for mental and physical relaxation. Treatment

should have for its chief aims: first, the prevention or at least the postponement of cardiac, renal and cerebral accidents; and second, the relief of symptoms as they occur during the course of the disease.

While it is necessary to emphasize to the patient the importance of adhering strictly to instructions as to regime, it is also important to prevent a continual concentration of his mind on his blood pressure. The use of the sphygmomanometer should be restricted, as too frequent estimations lead only to the patient's anxiety and give no helpful information. It is, likewise, always unwise to allow the patient to know the exact blood pressure readings.

Rest: Probably the best means we have to reduce pressure is by methods directed toward obtaining nervous relaxation: regulation of the working and sleeping hours, obtaining at least eight hours rest at night and a rest or nap after the noon-day meal. If the condition is a severe one, treatment may be started by a period of complete rest for a few days to a few months, demonstrating to the patient his ability to relax. When there is a sudden elevation of pressure, when definite myocardial symptoms appear or when there are warnings of cerebral accidents, rest in bed for a week or ten days is imperative.

Exercise: Carefully graduated exercise in the fresh air is beneficial. Golf, walking, horseback riding and like exercises aid mental relaxation and increase the muscle tone and the feeling of well-being. It should be curtailed at the point where signs of cardiac strain are apparent, such as dyspnea, palpitation and dizziness.

Climate and Altitude: The majority of patients are more uncomfortable in winter than in summer, and, therefore, a change to a warm climate during the winter months is desirable. At high altitudes a patient's cardiovascular system is called upon to increase the supply of blood to various parts of the body because of the anoxemia. It is an established clinical observation that hypertensive patients do better at sea level than at higher altitudes.

Diet: In the past, great stress has been laid on the diet in cases of high blood pressure whether due to hyperpiesia or to arteriosclerosis. Many forms of diet have been recommended. The great diversity of opinion convinces one of their inefficiency. High blood pressure is no indication of nitrogen retention, and, therefore, if the functional capacity of the kidneys is normal it is not necessary to restrict the proteins to a minimum. There is no good reason why one gram of protein to a kilogram of body weight should not be allowed. It may be necessary, however, to lessen materially the total intake of all food. Obese patients often do well when their weight is reduced through restriction of starchy and fatty foods, but in no case should dietetic curtailment be pushed to the point of undernutrition. Reduction of the fluids or the restriction of salt in the diet will not reduce blood pressure. There are times, however, when cardiac or nephritic edema complicate the picture, and require restriction of these articles. Alcohol, coffee and tobacco do not cause hypertension but because of their stimulating effect should be limited.

Physiotherapy: Warm baths or other sweating procedures as prescribed at the various mineral springs are frequently used and held in high esteem by the laity. The beneficial results derived are only temporary and the chief value is their sedative effect. They give the patient something definite to do, and have the added virtue, if given at spas, of requiring him to leave his daily work and enter into the routine of the sanitarium in regard to rules for elimination, exercise, rest and abstaining from overeating, drinking, smoking, etc.

Cathartics: It has not been proved that the condition of the bowels with its concomitant auto-intoxication has anything to do with the blood pressure; nevertheless, it is desirable to promote elimination in every way, and therefore, if there is any tendency to constipation it is advisable to prescribe mild cathartics.

Foci of Infection: Although this is probably not an etiologic factor in hyperpiesia, it should receive careful attention, because it interferes with good health and favors the occurrence of cardiovascular and renal degeneration.

Drugs: No drugs have much permanent effect in reducing high blood pressure, and even were it possible to reduce it to normal, it is doubtful whether much benefit would result, as it is possible that hypertension may be an important compensatory mechanism, which should not be tampered with. There are two conditions in which it is certainly inadvisable. The first is in advanced cardiac hypertrophy because here we diminish the flow in the coronary arteries. The second is cerebral arteriosclerosis where a reduction would seriously interfere with cerebral circulation and cause alarming symptoms.

Potassium Iodide: This has a traditional reputation, but its efficacy is much overrated except in syphilitic and toxic thyroid cases. At times, however, it seems to do some good, probably due to some interaction with the thyroid gland.

Vasodilators: Nitrates reduce the blood pressure temporarily and are useful only in allaying urgent symptoms such as cardiac pain, pulmonary edema and excessive fullness in the head. (a) Inhalation of amyl nitrite gives quick results but its effect is of brief duration. (b) Nitroglycerin comes next in rapidity of action and duration of effect; it is usually given in the dose of 1/100 of a grain tablet which is readily dissolved under the tongue. (c) Sodium nitrite is given in 2/3-grain doses; its effect is longer than that of nitroglycerin, but it has the disadvantage of causing gastric distress in most patients. (d) Erythrol-tetranitrate gives the most lasting results; it is to be given in 1/4- to 1/2-grain doses. It frequently causes severe headaches and many individuals are unable to take it.

Sulphocyanates (Thiocyanates): These were used many years ago, but were discontinued because of the disagreeable symptoms they caused. In 1924, they were revived by Westphal and have received a great deal of attention during the past few years. Their action is similar to that of the iodides. The suggestive dosage is 5 to 15 grains daily in any vehicle. It is said that they are useful in the early functional cases in subjects

who display marked fluctuation in blood pressure. Occasionally toxic results have followed their use, such as dermatitis, weakness and extreme nervousness.

Bismuth Subnitrate: The use of this drug is based on the theory that the nitrite radical is liberated by bacterial action in the intestines and then slowly and evenly absorbed to produce hypotensive action. The dosage is 10 grains in capsules three times a day. It is said to be of use in the early spastic cases before much arteriosclerosis has set in; however, recent experiments have proven that it does not develop sufficient nitrite action to exert any demonstrative effect on the blood pressure.

Calcium lactate, calcium chloride, cucurbitacin, extract of european mistletoe (viscum alba), benzyl benzoate, diuretin and a host of other remedies have been tried without any definite proof of their value.

Circulatory Hormones: These are derived from muscle and are considered of some use in producing relaxation in angina, but not as having any lasting results in hypertension.

Sedatives: Drugs of this type are probably the most useful in this disease. As one writer states, "they help the patient obtain that attitude of philosophic calm which should be the object of treatment." Most patients have excessive emotional reactions and are in need of drugs to hold them down. Bromides: 10 to 20 grains may be given three times a day. Luminal: $\frac{1}{2}$ to $1\frac{1}{2}$ grains may likewise be given two or three times a day. Chloral: 5 to 10 grains three times a day is a very useful drug, because it is an arterial dilator and a sedative. With so many new barbiturates on the market we are overlooking a most valuable drug in chloral. Sometimes it is only necessary to give the sedatives at night to secure sleep.

Glandular Extracts: Ovary has been used at the menopause with questionable results. Liver extracts have been tried and found wanting. Major, however, claims results from his extract "Heparmon."

It is difficult to evaluate treatment by drugs, because wide variations in blood pressure occur without treatment.

SURGICAL TREATMENT

In recent years, surgical methods have been advocated with the idea of promoting vasodilation or relieving vasoconstriction in the splanchnic area. This operation consists of a bilateral resection of the splanchnic nerves, celiac ganglion and the two upper lumbar sympathetic ganglia, and at times partial resection of the suprarenal glands.

Allen and Adson of the Mayo Clinic, reporting on a series of these cases, state that following operation, 70 per cent of the patients were benefited clinically, although 45 per cent showed no reduction in blood pressure, 30 per cent a fair reduction, and 25 per cent a marked reduction. Allen and Adson are particular in the selection of their cases for sympathectomy. Cases are observed carefully for the effect that rest, sodiummytal and sodium nitrite have on the blood pressure. If these measures do not definitely reduce the pressure, the patient is not considered suitable for surgery. It would seem then that the only cases suitable for surgery are the early cases in which spasm of the arteries is the underlying

cause for the hypertension, and organic changes in the vessels have not as yet taken place. It is hard to understand how such a small percentage of these cases shows a reduction in blood pressure and a rather large percentage beneficial effects.

In Goldblatt's experiment, where silver clamps are applied to the renal artery and varying degrees of pressure obtained, sections of the spinal nerves, complete thoracic sympathectomy, removal of the celiac ganglia, and partial adrenalectomy have no effect on the blood pressure. However, it must not be assumed that the results in animals would necessarily be the same in man; the clamp which is applied to the renal artery represents a permanent constriction. In the human disease, there is a constriction of the arterioles. Interruption of the nerve supply would have no effect on the clamp, but might have an effect on the small vessels within the kidney. The fact remains, however, that those patients who have been operated on, even though there is improvement, are still hypertensives. It would seem that patients who respond to this type of operation would likewise respond to rest, sedative and a change in their manner of living.

COMPLICATIONS

Cardiac failure: Over 60 per cent of cases of essential hypertension die a cardiac death. Consequently, careful attention should be paid to the condition of the heart muscle. At the first sign of failure, rest and digitalis should be used before signs of congestion appear. Some writers have suggested that tonic doses (10 M. t. i. d.) of digitalis be given in all cases of hypertension to forestall or postpone cardiac hypertrophy and failure. In angina of high blood pressure the usual remedies are employed: nitrites, theobromine, sedatives and rest.

Severe headaches: These are sometimes relieved by high pillows at night, hot mustard foot baths, aspirin, large doses of caffeine, bleeding, and lumbar puncture.

Cerebral Hemorrhage, Nephritis, Coronary Disease: These conditions should be treated in the usual manner.

SUMMARY AND CONCLUSIONS

1. There is no specific treatment for high blood pressure.
2. Elevation of blood pressure above the basic level depends on internal or external stimuli.
3. Therefore, measures directed toward the prevention or relief of these stimuli are very necessary to effective treatment.
4. Sedative drugs as bromides and chloral help to accomplish this.
5. Vasodilators of the nitrite type are only of temporary value.
6. The therapeutic effect of the so-called specific drugs is very doubtful.
7. Dietary factors in the absence of nitrogen retention are unimportant except overeating which leads to obesity.
8. Foci of infection are not proven etiologic factors, but they add to the load of the cardiovascular system and should be treated.
9. Increasing amounts of rest in bed and the use of digitalis are indicated at the first sign of cardiac failure.

Minnesota Medical Problems*

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DURING the past year the economic side of medicine has been a favorite topic for discussion. Therefore, I have chosen to discuss our medical problems from this angle rather than from the scientific.

Dr. Chesley, who has been head of the National Public Health Secretaries Association for the past thirteen years, says never before has he seen so much outside interference with the practice of medicine as during the past four or five years. Many outside and some inside the profession believe we have come to an epoch in the history of American Medicine when we must decide whether we shall continue to control the practice of medicine or turn this control over to the politicians. Just and constructive criticism we do not resent, but much of the criticism and propaganda put out today is fostered by clever politicians, racketeers, and sensational and commercial writers. Taking advantage of the lack of knowledge of the public on medical matters, these people have created an entirely false impression of the practice of medicine.

In Minnesota, now, we have a committee attempting to secure popular writers who may be able to get the real truth on medical matters before the public. We feel that if we could successfully get the truth before the public, there would be little demand for socialized or government-controlled medicine. Unfortunately, committees made up largely of members of our own profession have put out propaganda and created impressions that are not correct.

Some time ago a representative of labor unions of Wisconsin, speaking from Superior, Wisconsin, quoted the Committee on the Cost of Medical Care to the effect that 46 per cent of those on a salary of \$1200.00 or less and 42 per cent of those on a salary of \$2000.00 or less got no medical care. Those who practice through the rural areas know that this is absolutely false and misleading. In the first place, they did not show need for medical care in these cases. Again, it is a recognized fact that 17 per cent of the people of the United States refuse medical care. This class is made up of the cults and their followers. In some areas during certain periods 15 to 30 per cent of the people do not need medical care. Recently our State Medical Association had printed in the public press throughout the state notices asking for reports on any or all who were not getting adequate medical care. We received about 200 responses. Out of this group only a very small number did not have adequate medical care available.

The Committee on the Cost of Medical Care in their public report gave the impression that their cost of medical care was for physicians' fees only, when in fact it included dentistry, nursing, hospital care, drugs and all the expenses entailed by the sick patient. An analysis of their figures shows that only 29.8 cents of each dollar

went to the physician. Had they compared the cost of luxuries or other expense with the cost of medical care, it would have seemed more just.

Dr. Scammon, of the University of Minnesota, has made a survey showing the amount spent by the average family for luxuries in comparison with medical fees. He has shown that the average family spends per year for luxuries as follows:

Auto	\$150.00
Tobacco	60.00
Candy	37.00
Drinks & chewing gum	34.00
Radio and music	25.00
Physicians fees	24.00

He has also shown that for healers other than physicians the public pays 125 million dollars per year, and 350 million dollars for patent medicines.

The so-called 430 physicians state in their proposals that there would be more financial support for research, medical education and preventive medicine under government control. Dr. Scammon has shown that socialized medicine in Minnesota alone in 1933 would have cost 20 million dollars, or one-half the entire state tax levy. These gentlemen must have miscalculated the cost of state medicine when they counted on extra money for any other purpose.

The National Health Conference recently held in Washington administered a severe rebuke to our great American Medical Association. In their lengthy discussion and conclusions they entirely ignored the counsel and advice of this organization. Much of their discussion was based upon the so-called "Door Bell" medical survey. This survey was a house-to-house canvass of 80,000 American families made by W.P.A. workers. These W.P.A. workers knew nothing about medical matters of any kind. They could not even differentiate a physician from any other individual who claimed the title of doctor. Yet, the statistician, Mr. Kellog, says this was the greatest medical survey ever made in the history of American medicine. Some of their conclusions were:

1. That one-third of the people of the United States received no medical care.
2. That there was more illness among the poor than the rich.
3. That thousands of people had their dreams of home, farm and everything worth while in life wiped out because of the great cost of medical care.

Here, too, they do not seem to realize that 17 per cent of the people refuse medical care and that easily another 17 per cent do not need medical care.

It is readily understood that there is more illness among the poor than the rich, but this is not because of lack of medical care but rather because of poorer living conditions. We are aware that some people have diffi-

*Presidential address, read before the 20th annual meeting of the Alumni Association of the Mayo Foundation.

culty bearing the burden of a long illness, but, as Dr. Scammon has shown, the average family spends over twice as much for tobacco each year than for physicians' fees. Their suggestion of 850 million dollars per year for ten years would not be objectionable provided the need for it has been carefully thought out, and that we could be assured of the proper control of its expenditure.

In Minnesota we feel that we have now the coöperation of all agencies taking part in the care of the sick, to the extent that we could control the expenditure of any amount of money which is likely to come in for that purpose. One consoling suggestion of the Technical Committee on Medical Care of this Conference, was that each state be allowed to work out its own problems. Our problems, as great as they are, we feel are more under control than in some states. At the beginning of 1938 we had about half a million people on some sort of relief. There are about two and one-half million people in this state, so we have about one in every five on some sort of relief. From the beginning of the entrance of Federal money into this state, we have had frequent meetings with Federal, State and County committees for the purpose of formulating the best possible plans for the care of the indigent. We feel that all of these agencies are coöperating with us now to the highest degree. The State Direct Relief Administration, in coöperation with the 87 County Welfare Boards throughout the state, care for all those on direct relief. We have a medical committee in each county working with the County Welfare Boards so that each patient is carefully classified and given medical care as these combined committees see fit. There are now 152,854 on direct relief. The W.P.A., still a federal agency, employs 182,896. These are taken care of medically much the same as laborers under Workmen's Compensation. The State Board of Control has many sub-agencies, chief among which are old age assistance, mothers and dependent children, crippled children and the blind.

Under old age assistance, those indigent over 60 years of age receive a maximum of \$30 per month. This is frequently not enough for unusual medical care. It is then supplemented by county and state relief funds. There are in this class 62,357. Mothers and dependent children, numbering 11,512, are not only offered medical care, but special clinics are established at convenient points throughout the state where special obstetricians and pediatricians visit to aid the practicing physician in diagnosing and suggesting treatment for those cases. Public health nurses are sent out to help with the clinics and search for those in need of attention. There are about 10,000 crippled children in the state. Everything possible is done to cure these children and make them useful citizens. Special clinics are also held at various points throughout the state for these children. Orthopedists visit these clinics and aid the local physician in every way possible. If these children cannot be taken care of locally they are transported to points where the best possible service is rendered. Here again, public health nurses help conduct the clinics and round up those in need of care.

The State Board of Health, under the direction of Dr. Chesley, does everything limited finances permit, in aiding the practicing physicians in vaccination, immunization, control of venereal disease, typing pneumonia and supplying serum, and everything one would expect of a public health board. Much of this money could be spent to advantage in this department.

The personnel, as well as the various heads of these agencies, are all working in such close coöperation with our State Medical Society now that we need have little fear of government control through these channels.

Just how to prevent government control of the low income group is our greatest problem at the present time. Shall we continue to care for this group for little or no financial remuneration, or shall we accept government money under our control? Many of our own profession contend that we should be remunerated for the care of the indigent and given an adequate fee for the care of the low income group. Others contend that health insurance, except the voluntary type, is dangerous and may lead to government control. Some advocate insurance of the type now employed in "Group Hospitalization" but controlled entirely by the medical profession.

In Hennepin County we have the Medical Service Bureau. This is an adjunct of the Hennepin County Medical Society. The men belonging to this Bureau have volunteered to take care of the very low income group for whatever they are able to pay. All charity hospitals and other charity organizations are notified to refer to this Bureau those who apply, but are not eligible to the charity institution because their salaries are just above the level required for eligibility. During the years 1936 and 1937, only 147 patients have applied to this Bureau for service. Others thus referred have gone back to the family physician where they have been previously cared for, for little or no remuneration. This Bureau has been in existence nearly three years. During this time it has received \$51,000 from the Minneapolis Welfare Board for immunization and vaccination purposes. The patient is taken care of by his family physician, who receives his fee from his Bureau. This Bureau could readily be made state-wide and through it money from any source could be distributed wherever needed for prevention or medical care. This could serve as one means of preventing outside interference with medical care.

We feel that in Minnesota we have a very sympathetic understanding among the majority of the members of our legislature and state officials, strange as it may seem. We owe much of this feeling to one of our number, who, in past years spent much of his time at the capitol during legislative sessions, teaching members of the legislature their duty to the public in medical matters. This leader was the late Dr. Herman Johnson. He readily tagged the legislators who were there for selfish purposes and the constituents of that legislator back home were soon notified.

In Minneapolis we had an organization of dentists, pharmacists and medics that functioned well when we were called upon to take care of those who were plainly

not there in the interest of the public or of the profession. Minneapolis has long been the center of cults, and others unfavorable to the medical profession. We have twenty-seven legislators in that district. Much influence was exerted upon the legislators by these pseudo-medical groups. Up to 1927 little attention was given to the requests of the medical profession. We frequently got the retort that the medical profession was of little consequence so far as politics were concerned. In 1929 we exerted our influence to see that several of those who were introducing and fostering obnoxious bills were not returned. Since 1928 we cannot recall an instance of one of these legislators from Minneapolis introducing or fostering obnoxious bills. Dr. Johnson created an atmosphere of respect for the medical profession about the capitol and among the legislators throughout the state.

At our state meeting in Duluth this year, the Governor stated that he would not make an appointment on a public health or medical board without consulting the State Medical Association. With this attitude on

the part of our legislators and state officials, and the coöperation of all agencies handling relief, we feel that Minnesota, if states are allowed to control their own affairs, will be able to avoid outside control of the practice of medicine for some time to come.

Most of our critics suggest some sort of government control. One of their reasons is that it should lower our mortality. In Germany today, under a socialized system of medicine, the mortality is 12.3 per 1000 of population; in the United States, it is 10.7 per 1000 of population. In Germany, 40 per cent of the money paid for medical care goes to politicians and non-medical men, while only 60 per cent goes to the physician who takes the entire responsibility of the sick patient.

When we sum up all the pros and cons of the various systems suggested, we cannot help but feel that our present system is the most satisfactory to the well-informed. There is nothing in this system whereby any scientific advances are hindered, nor does it in any way bar us from accepting any reasonable outside assistance.

Whither and Why in College Health Work?*

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AT the risk of being a nuisance, I propose to ask some questions and suggest some critical thinking concerning our work as a whole. The program of this conference like twenty or thirty preceding ones is concerned with many details of our work which have been accepted without much question. We have had some discussions on the philosophy of our work, but possibly not enough. I now recall papers by Father Schwitalla¹ and Florence Brown Sherbon² which have been challenges to our critical thinking.

As for the direction of our programs, are we simply drifting, are we just continuing to grow as Topsy grew, are we carrying on in the tradition of medical practice as applied to a particular population or industry, are we being carried along by the inexorable general forces of social evolution or to what extent are the general patterns of our programs being developed in response to the vision of superior minds which recognize in educational institutions opportunities for social leadership? Many other such questions could be raised by one who enjoys that form of indoor sport. The answers however are not so easy and would probably depend largely upon personal opinions with all of the reasonable doubts as to their validity.

Most efforts at student health work have been

*Presented before the nineteenth annual meeting of the American Student Health Association, December 29, 1938, New York City.

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launched with no better compass than a layman's uncritical idea of the traditional function of the physician. All too frequently the project was soon in troubled waters because the inadequate staff was swamped with an overwhelming demand for attention to the sick and injured, an obligation to carry an impossible program of teaching hygiene, routine examinations, inspections and care of athletic teams. Since the budget and staff were unequal to the program, the work often lost the respect of the students and faculty. Thus, most important opportunities in higher education have failed of realization because college administrators failed to stick closer to their lasts.

Wherever we are headed and in response to whatever forces, we are growing in size and position in our institutions. Our conferences, reports, and committee work improve the standards and effectiveness of many phases of our activity and the need for valid measurements of our results has been recognized and often expressed. One cannot compare the incomparable, hence comparisons and common standards are difficult to apply to our several college situations. Some have seen in our diversity of programs and emphases a very fortunate situation characteristic of the democratic evolution of culture. Even with the values of these differences clearly in mind, I think it is well for us to be critical of our programs and strive for direction, evaluation, and standardization in keeping with our work in higher institutions of learn-

ing. Much of my point of view applies to health work in schools at lower levels as well.

Scoring outlines have doubtless done much to improve public health departments of our cities and perhaps they have potential values in our work. Can we develop such means of evaluation however, without some previous discussion of relative values in the larger phases of our work? In a recent paper³ these were evaluated on a numerical basis to stimulate discussion of relative values in the college situation. A present framework of desirable outcomes without considerations of method, if accepted widely, should help in the development of evaluating devices and in raising standards of student health departments. The following tabulations and comments are submitted to this end.

RELATIVE VALUES IN COLLEGE STUDENT
HEALTH WORK

A—Principal Phases

	Points
I. Organization and Administration	100
II. Institutional Program	50
III. Sanitation	150
IV. Health Education	400
V. Student Personal Service and Supervision	300
	1000

I. ORGANIZATION AND ADMINISTRATION
(100 points)

Conferences relative to organization for this work have generally agreed that the various phases of college hygiene should be united under a single head or so established as to insure efficiency and coördination of effort. Research, varied staff experience and reports have been emphasized.

POINTS DISTRIBUTION

1. *Centralization* (50 points). Centralized organization and administration is sufficient to insure adequate (a) authority for the control of health questions, (b) centralization and unification of records, (c) efficiency and coöperation of various persons and services.

2. *Research* (20 points). The investigation of health problems particularly related to student health is being advanced to a good standard.

3. *Varied Experience* (15 points). Major staff members are encouraged to participate in a wide range of the work—clinic, teaching, physical education, etc.

4. *Reports* (15 points). Frequent analyses of data and reports are made to promote best work and its proper appreciation.

II. INSTITUTIONAL PROGRAM (50 points)

A consideration of student health not usually mentioned in such outlines deals with less definite questions of student health as influenced by the course of the daily academic and extracurricular program. Studies on the relation of fatigue to student health have not been widely reported but the question is of importance.

POINTS DISTRIBUTION

1. *Daily Fatigue* (20 points). The duration and arrangement of recitations, vacation periods, games, examinations, drills, laboratory work and so on produce a minimum of fatigue in students.

2. *Academic Pressure* (20 points). Unwholesome pressure on students to meet scholastic standards is eliminated.

3. *Related Hazards* (10 points). Hazards of extra-curricular or quasi-academic activities are eliminated.

III. SANITATION (150 points)

As the oldest emphasis in general public health work, attention to the student's environment and sources of life still is demanded. With the improved standards of sanitation generally, however, this is becoming relatively less important.

POINTS DISTRIBUTION

1. Adequate food of good chemical quality, free from disease-producing organisms (30 points).

2. Food and drink service free from controllable mouth or intestinally borne infections (35 points).

3. Wholesome climate and adjacent territory (15 points).

4. Adequate facilities for exercise, sports and recreation (20 points).

5. Living quarters with adequate space, light, heat, equipment, cleanliness, toilet and fire escape facilities. (20 points).

6. Class rooms, libraries, shops, gymnasiums, pools and laboratories to be adequately clean, lighted, ventilated, spaced, free from mechanical hazards and provided with adequate toilets, drinking fountains and fire exits (20 points).

7. Freedom from obvious health hazards—fire in particular—in public buildings off the campus (10 points).

IV. HEALTH EDUCATION (400 points)

Health teaching would seem to be the part of the entire program which is clearly a responsibility of an educational institution. This has received no more than half-hearted support in the history of college hygiene generally. Broadly defined, and including health promoting self directed features, health education merits the greatest single allocation of resources in the program. Clinical medical service to students should not be allowed to divert limited resources from health education. The problem of physical education as related to the college health program would be rated under this heading.

POINTS DISTRIBUTION

1. *Formal Instruction* (300 points). All candidates for the bachelor's degree receive sufficient instruction to provide an understanding of modern personal and community health problems. This should enable the graduate to serve intelligently as a layman leader in personal, family and community health problems.

The level of subject matter and methods of instruction are comparable to those for other subjects in the

institution. Methods are guided by modern pedagogy. These conform to the recommendations of the National Conferences on College Hygiene.

2. *Informal Instruction* (100 points). A high standard of informal, more personal, instruction by use of health conferences, guidance, illness situations, general and group lectures, publications, campaigns and posters, etc., is sustained.

V. STUDENT PERSONAL SERVICE AND SUPERVISION (300 points)

Consistent with trends in public health work in general, the developments in student health work have become more and more centered on the individual student health problems.

POINTS DISTRIBUTION

A—*Routine Health Examinations* (100 points).

1. *Before Admission* (50 points): Prior to admitting the student finally, the institution has a record for him which meets a high standard of health examination. This record reveals conditions dangerous to the student or his associates and indications for promoting the student's best development. The examination includes history, attention of specialists including psychiatry, with laboratory and special tests. On the basis of this record, students are rated in various ways for best adaptation to the college program. The examination is followed by appropriate action, including reasonable efforts to secure attention to health defects.

2. *During Residence* (30 points): At yearly intervals, students have a health conference of not less than fifteen minutes' duration with a physician.

3. *Preliminary to Extra Work* (10 points): Prior to participation in institutionally approved curricular or extracurricular, possibly somewhat hazardous activities, such as extra hours of study or athletics, health approval is first obtained by the student.

4. *Academic Failure* (10 points): Students who fail to make satisfactory progress in academic work are required to check on health status.

B—*Care of Student Illness* (150 points).

This phase of student health work has presented most difficult problems. It is the activity which is most definite and for which the demand has become most insistent. Some institutions have taken practically full responsibility for actually supplying complete care of student illness. This has usually been supported in part at least by health fees collected from all students with annual tuitions. Some institutions have gone part of this distance and others operate on a policy of assuming practically no such responsibility.

A college is justified in taking the position that a high standard of medical service must be available

to its students but that the institution would assume to supply that service only because it is not forthcoming otherwise. The college has responsibility for custody of students; students learn best by actual experience the methods of good scientific medical care; since the prevention of much illness requires early attention to beginning processes, students should have access to medical advice with the least possible hindrance, such as fear of costs; also the educational experience of worthy students should not be allowed to terminate because of the element of large expense for major illness. When these conditions can be satisfied otherwise, most college administrators will probably be glad to confine their hygiene programs more nearly to work characterized by the term health education, broadly defined. It is fair and proper to question the extent to which these clinical activities should now be allowed to retard the development of the primary health education features of a program in college hygiene.

The 150 point award is made when students are able to obtain a high standard of scientific medical care for any condition which has significant relation to their educational experience. It is obtainable at all times with reasonable dispatch and under a financial arrangement which does not discourage early solicitation and which does not terminate the student's education because of expense for attention to illness. Attention of all specialists, including psychiatry and allergy, and special diagnostic services are available.

C—*Contagious Disease Prevention* (25 points).

Students are sufficiently controlled to apply valid established specific methods for the prevention of the spread of communicable disease.

D—*Unit Health Records* (25 points).

Complete unified personal and summary health records are kept to serve the purposes of advising the student, compiling reports and making essential studies. Significant applications of these data should be possible by student general advisers.

SUMMARY

1. The developing student health programs in our institutions of higher learning need direction on the basis of a critical evaluation of activities in relation to primary objectives of such institutions.

2. Health education should be the first and best supported part of the college health program, so far as primary college interests are concerned.

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A Painless and Comfortable Electrical Labyrinthine Tester

C. D'Arcy Wright, M.D., F.A.C.S.

Minneapolis, Minnesota

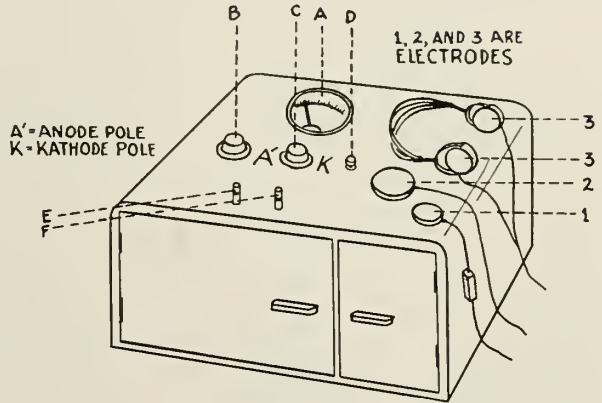
AN electrical instrument for testing the reactivity of the static labyrinth was developed and is described by the author.

In the top of the cabinet plate is a milliamperemeter, *A*, which is set in the circuit of two earphones. Switch *B*, on the left, controls the strength of the increasing current as it runs through the milliamperemeter, *A*. The polarity switch *C*, in the middle of the cabinet plate, is a make-and-break connection of the cathode and anode currents for testing one static labyrinth by itself. The button, *D*, at the right of the cabinet, is also a make-or-break switch. *E* and *F* are poles of the battery in the cabinet box. Pole *F*, on the right side, should always be attached to the cord of the ear electrodes.

When testing one labyrinth separately, the larger electrode (2) is applied to the hand on the side corresponding to the ear to be tested. The smaller electrode, containing a galvanometer, is placed on the concha of the ear. When there is no hyper- or hypo-irritability of the labyrinth, the test will be observed when 4 Ma. of electricity is used. With this current, the cathode make produces a nystagmus towards the side of the ear tested and a cathode break of the current produces a nystagmus away from the side of the ear tested. The make and break of the anode current produces the opposite reaction.

When testing both labyrinths at the same time, the ear electrodes are placed on corresponding parts of the concha of each ear. The larger electrode, from pole *E*, is applied to the middle of the forehead. The switch *B* turns on the current until 4 Ma. are used. Nystagmus, if any, is observed by directing the patient to look slowly from the left to the right, providing no nystagmus has occurred when the patient looks straight ahead. No nystagmus will occur if the static labyrinths are normal, since the stimulating current is equal to both labyrinths.

If 2 Ma. produce a reactivity in the static labyrinth, shown by nystagmus, the labyrinth is hyper-irritable by 2 Ma. (4 Ma. being normal). If 6 Ma. are used to produce a reactivity, the labyrinth is hypo-irritable by 2 Ma. If spontaneous nystagmus is present, the eye is adjusted to the least extreme lateral position at which spontaneous nystagmus does not occur. The pointer



Electrical Labyrinthine Tester.

from the headband (contained in the outfit) fixes the eyes to this point.

Comparative irritability of the static labyrinths is of value in diagnosis. Different individuals require different strength of current to produce reactivity of the static labyrinth. The amount of the current may vary from 2 to 6 Ma. The same current is always required to produce the same reaction in the two sides in any patient when there is no hyper-irritability or hypo-irritability of the vestibular nerve.

With the present arrangement (due to improved electrical development of the radio), the severe symptoms of vertigo, faintness and sickness, so frequently produced by other labyrinthine apparatuses, has been eliminated by this new tester. No discomfort has followed the use of any labyrinthine tests with this instrument. In addition, by slowly turning the switch, *B*, that controls the strength of the current, any unpleasant symptoms can be anticipated and observed before they develop into disturbing reactions.

This new electrical labyrinthine tester should be extremely advantageous since its application is a painless and comfortable procedure. The tester may be applied to any patient, regardless of his condition. On the other hand, because of prostration of the patient, it is often impossible to use other labyrinthine testers when a differential diagnosis is required involving the static labyrinth.

The JOURNAL LANCET

Represents the Medical Profession of
MINNESOTA, NORTH DAKOTA SOUTH DAKOTA and MONTANA

The Official Journal of the

Minneapolis Clinical Club
American Student Health Association

North Dakota State Medical Association
South Dakota State Medical Association
Medical Association of Montana

The Sioux Valley Medical Association
Great Northern Railway Surgeons' Ass'n

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MINNEAPOLIS, MINN., MARCH, 1939

MEDICAL ASSOCIATION OF MONTANA 1938 MEETING

In this issue of the JOURNAL-LANCET, there appear five papers which were read at the 1938 meeting of the Medical Association of Montana.

In 1937 the officers of the Medical Association of Montana realized that the system of combining the business and scientific sessions into one meeting was not the most efficient for either conducting the business of the association or digesting the meat in the scientific papers. Conflicts in the meeting time of the House of Delegates and the presentation of scientific papers were frequent. The new officers of the society therefore decided to attempt a new procedure. In 1938 the business session of the association was held in the spring of the year and the scientific session was held for two days in the fall of the year.

The speakers at the scientific session held in Lewistown, Montana, September, 1938, were selected from the faculty of several large medical schools and the subjects were selected which would be of interest to the majority of the membership. Two members of the local association were selected to discuss each paper, following which the discussion was open to any member present. The papers and the discussions were very interesting and the attendance at the sessions was very good.

Judging from the comments heard during and after the meeting, this new departure in the method of conducting the state meeting has met with general approval.

A. R. F.

MEDICAL MOVIES

"Did you see that movie this afternoon?" is a common question heard in the lobby at any medical convention.

We have all noticed the increased interest in the movie programs at the national and sectional meetings of our medical and surgical societies. So great a part is visual education taking in the presentation of ideas, that many convention-goers spend much more time with the new medical movies than they do at the clinics in the hospitals. Much of the technic can far better be observed and studied in a good movie than in an overcrowded amphitheater, where little more can be gained than the inspiration of seeing the master at a great distance and possibly feeling the thrill, such as it is, of saying you have seen him operate in his clinic!

It occurred to some of us who are far removed from the great medical centers that we might get a great deal of information, inspiration, and even later surgical technic, from frequent programs from the vast number of sources which have provided moving pictures through various grants. These pictures can be selected from those which are approved by our national societies.

A year ago to add a little variety at the end of the monthly staff meetings of the Madison Community Hospital, in Madison, South Dakota, we started running one movie subject at the close. There was a desire on the part of the doctors for more frequent programs of this type, so this year we are having a Dutch Lunch every Thursday noon, and an attempt is made to make the subjects varied enough for the interest of all doctors.

As far as possible, there is on each program, surgical, obstetrical, medical, and, occasionally, purely scientific or pharmacological subjects.

On Tuesday of each week a postcard announcing the program is sent to the members of the staff and to the doctors within driving distance of Madison. An example is the one sent out for Thursday noon, March 2, 1939.

"Newer Methods in Anesthesia."

"Gastrostomy."

"Hernioplasty for Left Indirect Inguinal Hernia."

"Hernioplasty—Modified Bassini Technic."

"Hernioplasty and Lipectomy."

"Reduction of Intussusception."

These weekly movie clinics are scheduled each Thursday from October until May 11, and may be continued later, depending upon the wishes of the doctors, for the supply of available films is unlimited. Each week brings information of more sources of medical movie subjects. The cost of putting on these programs is very small. A good 16 mm. projector is all that is necessary, with a room that can be darkened. So far the actual cost has not exceeded \$1.00 per week, which includes the postage on the returned films and the postcards.

R. S. W.

THE DRY GLUCOSE TEST

Many diabetic outfits are on the market for self-administration of insulin in emergencies. Some are so

complete in detail that they include alcohol, cotton, and an automatic injector. Diabetics have also found it necessary to acquire the technique of urine sugar determination in order to apply proper therapy from time to time; but the equipment for this is not supplied in the outfits. The fact that sugar reducing tests are cumbersome, requiring one of two liquids, at least one test tube, and a heating lamp has doubtless been the reason for such omission.

Recently, there has come into the market a test consisting of a powder which may be placed on a piece of paper and a drop of the suspected urine deposited thereon. A gray or black color reaction indicates an abnormal amount of sugar. Urine containing less than 0.1 per cent of sugar will cause no change but merely show the amber color of urine. If 0.2 per cent sugar is present, the powder turns a light gray; if 0.5 per cent, it takes on a darker gray; and in case it be present in 1 per cent or more, the powder becomes definitely black. The reaction is said to depend upon the presence of bismuth oxide and sodium hydroxide.

The Swedish chemist, Nylander, originated a reagent which contained bismuth sub-nitrate, Rochelle's salt, and caustic soda. When a mixture of diabetic urine and this reagent is heated, a black precipitate of metallic oxide results. In the new micro-reagent, no heating is necessary; therefore it has a distinct advantage when sugar determination must be delegated to the patient. The physician too may find it useful in bedside practice.

A. E. H.

Book Reviews

Modern Surgical Technic, by MAX THOREK, M.D., professor of clinical surgery, Cook County Graduate School of Medicine; complete in three volumes, 274 illustrations; Philadelphia: J. B. Lippincott Co., 1938. Price \$33.00.

Because available surgical works fall in two categories, (1) voluminous systems covering a wealth of material and offering multiplicity of procedures and (2) too abridged single volumes, Dr. THOREK believes there is a genuine need for a succinct work on surgical operations. His objective in these three volumes, therefore, is the fulfillment of this need. The content of these volumes is directed particularly to students and to general surgeons and to those practitioners who are called upon to perform emergency operations. The highlights of surgical anatomy are presented before discussing operative procedure. All important subjects, no matter how technical the surgical procedure, or how far afield from pure surgery, are discussed in these volumes. Amputations, ligation of blood vessels, fractures and dislocations are illustrative of this inclusion. Dr. THOREK has developed a step by step method of describing operations; both original operative methods and standard ones are given equal importance. Illustrations are used throughout the text very generously since "one picture is worth a thousand words." Mr. W. C. SHEPARD has graphically illustrated the three volumes. *Modern Surgical Technics* should receive a very warm reception from the surgeons of this country. Undoubtedly these volumes will outdistance the fine reception already given to Dr. THOREK's *Surgical Errors and Safeguards*.

The Fundamentals of Internal Medicine, by WALLACE MASON YATER, A.B., M.D., M.S.; cloth, 1021 pages, illustrated; New York: D. Appleton-Century Company, 1938. Price \$9.00.

This volume is designed primarily for the introduction of students to the subject of internal medicine. Surgical, obstetrical and gynecological diseases are omitted. An attempt has been made to present the minimum amount of knowledge of clinical medicine a medical student or general practitioner should have at his fingertips. Its purpose is to provide a foundation for a superstructure of more extensive knowledge. Actually it is a glorified outline of the more common diseases encountered in everyday practice. Unfortunately the details of treatment are inadequate for the meticulous care of a patient without seeking other sources of therapeutic knowledge.

Middle Age Is What You Make It, by BORIS SOKOLOFF, M.D., Sc.D.; 1st edition, black cloth, black-stamped, 169 pages plus bibliography and index, no illustrations; New York City: The Greystone Press, Inc.: 1938. Price, \$1.75.

This is a good book for the lay person; it is well-annotated and the author is a well-known figure in contemporary medicine. He has been for some years associated with LEO LOEB, professor of pathology in the Washington University School of Medicine; and is now associated with the International Cancer Prophylactic Institute. He has written for the *American Journal of Cancer*, the *Journal of Pharmacology and Experimental Therapeutics*, and has been a collaborator of METCHNIKOFF's at the Paris Pasteur Institute. The book should be a valuable one for the mass of men.

Societies

SCIENTIFIC PROGRAM OF THE MINNEAPOLIS CLINICAL CLUB

Meeting of December 8, 1938.
Erling S. Platou, M.D., Presiding

SINGLE STAGE RESECTION OF THE LARGE BOWEL WITH END TO END ANASTOMOSIS

ORWOOD J. CAMPBELL, M.D.
MINNEAPOLIS, MINNESOTA

Mr. F. B., age 52, was admitted to Abbott Hospital February 20, 1938, complaining of constipation, crampy colicky pain in the left side of the abdomen and occasionally mucous and blood in the stools.

He had always been constipated. Four years prior to admission he had an attack of biliary colic and since then had had periodic examinations at six month intervals. Repeated barium enemas had been normal. For the past six months he would go three to four days without a bowel movement and only succeeded in obtaining a movement after taking mineral oil and a cathartic. The stools were formed but frequently mixed with mucous and blood. There was no weight loss. Barium enema administered shortly before his admission to the hospital revealed partial obstruction and a filling defect characteristic of carcinoma. The lesion was situated at the junction of the descending colon and sigmoid. Physical examination was normal except for tenderness in the left lower quadrant and a palpable mass which was somewhat movable.

The patient was put on a low residue diet, given one and one-half ounces of mineral oil and two saline enemas daily.

He was operated February 24, 1938, under ethylene anaesthesia. A large annular carcinoma was encountered at the junction of the descending colon and sigmoid. The only evidence of metastasis was the presence of a single node in the mesentery near the tumor. The bowel proximal to the tumor was entirely empty. There were no signs of inflammation. The tumor was resected together with about five inches of bowel both proximally and distally. The mesentery was removed to its base. End to end anastomosis was done over a Rankin clamp using two rows of catgut suture. The suture line was reinforced by covering it with neighboring fat tags. On section, the pathologist, Dr. J. S. McCartney, found adenocarcinoma. The lesion was annular, ulcerated and measured five centimeters in length. There were four lymph nodes, only one of which contained tumor. All were situated near the bowel.

The convalescence was uneventful. The wound healed without infection. A rectal tube was inserted at frequent intervals allowing for the escape of gas. Food was withheld until the fifth day when the patient began to expell flatus without the aid of a tube. Mineral oil was started orally on the fifth day. On the sixth day he had a small liquid stool and on the seventh a large formed one. He was discharged on the fifteenth postoperative day with instructions to remain on a bland diet for an additional week and to continue taking one-half ounce of mineral oil three times daily.

This case, though it shows no unique features, is presented because the patient is available for appearance and because it is quite characteristic of a small series of carcinomas of the large bowel which have all been treated by resection with primary end to end anastomosis. There have been eleven consecutive cases in all, with one fatality. This patient developed pneumonia well along in his convalescence. At autopsy the suture line was intact and there was no evidence of peritonitis. One patient developed a recurrence near the site of anastomosis two years after primary resection. He was successfully reoperated using a one stage combined abdominoperineal resection. Nine of the tumors were in the left half of the colon. Only one of the patients had a high degree of obstruction. He was completely obstructed by a carcinoma of the sigmoid. The abdomen was

grossly distended. There was no vomiting. A flat plate of the abdomen revealed enormous distension of the colon. The patient was given from three to four ounces of mineral oil by mouth daily and put on a non-residue diet with the additional support of glucose solution intravenously. On the seventh day, because we despaired of opening the obstruction medically, he was operated. The bowel could not be delivered because of the distention but was brought up to the abdominal wall ready for later opening. Later on the day of operation he started to pass large quantities of liquid stool per rectum. Colostomy was never done. After three weeks his tumor was resected. The condition of the bowel at the time of operation did not suggest that obstruction had ever been present.

In none of the eleven cases was surgery undertaken with the object of accomplishing a single stage resection. However, all were found to be ideal cases for such a procedure with no sign of obstruction, no edema or evidences of infection except in the tumor itself. In no case was preliminary colostomy or cecostomy done.

The procedure of primary resection and end to end anastomosis is not new but was in fact the only method used until Bloch in 1892 and Paul in 1895 reported their exteriorization procedures. Later Mikulicz reported sixteen cases so treated with a mortality rate of 12.5 per cent which represented a tremendous improvement over previous mortality rates. Since then, graded operative procedures with preliminary decompression where indicated and modified forms of exteriorization operation have proven fundamentally sound in principle and are permanently established.

The eleven cases were so operated on the premise that under ideal conditions and using an aseptic technique for anastomosis there should be no additional hazard to the one stage operation. By withholding food and by giving relatively large quantities of mineral oil the contents of the left half of the colon may be kept fluid enough to pass through the stoma at the site of anastomosis.

The technique is necessarily exacting and meticulous and should not be undertaken by any but a well trained surgeon. Particular care must be exercised to maintain a normal blood supply to every portion of the bowel to be retained. There are obvious advantages to the one stage resection such as the ability to remove more bowel, (since added length is required to exteriorize a loop) shortening of the period of hospitalization, lessened expense and greater comfort to the patient. None of those advantages is important as weighed against a low mortality rate.

It is the mortality rate which will eventually determine whether the above premise is correct. It is not sufficient that the rate for the one stage resection equal that of the stage procedures. Since the cases must be ideal to justify the procedure, then the mortality rate should reasonably be lower. Who can state, that in such a selected series, a given mortality rate would not have been lower had an obstructive resection been done?

Eleven cases is too small a series on the basis of which to draw any conclusions. Many men of far wider experience have condemned the one stage procedure on the left half of the colon. With additional experience the reporter may be forced to the same conclusion but until then it is his belief that the single stage resection of carcinomas of the colon with end to end anastomosis by an aseptic technique is a reasonable and relatively safe procedure. It is also his belief that by using large quantities of mineral oil, (i. e. three to five ounces per day), low residue diet and plenty of time, patients with relatively high grade obstructions may be completely decompressed and saved from the necessity of preliminary colostomy or cecostomy.

DISCUSSION

Dr. A. A. ZIEROLD: I believe that this has been an unusual presentation. Dr. Campbell has reviewed the various methods that have been developed for anastomosis of the bowel. You can recall, as he said, the development of the tube resection, the development of the various sutures and various types of clamps that were devised to facilitate the procedure, and notice that with all the changes in the procedure, the mortality has gone along at about the same level until within comparatively recent years when the mortality has dropped not only with end to

end anastomosis but also with the delayed types such as the obstructive resection type or modified Mikulicz. This, as Dr. Campbell stated, is the result of the recognition of obstruction as the basic factor in the complicating peritonitis. It probably is not necessary that we have so many involved and complicated procedures in closing the bowel. It is also probable that much of the effort that has been expended has been expended uselessly because the danger and the defeat lay in the obstruction of the bowel, the distention of it and the permeability of it. No matter how carefully an operation is done, as has been mentioned, more handling, more exploration in many instances is quite sufficient not only to invite but to institute a peritonitis. Peritonitis has been of course, the bete noir of all colon surgery, the one thing against which most of the effort has been expended. It is probable that with adequate care and preparation, proper selection of cases and time of operation, the mortality in excision of colon carcinoma could be lowered very materially whether end to end anastomosis is used or whether the obstructive type of resection is employed.

I cannot help being impressed by one thing that Dr. Campbell illustrated in mentioning his end results. It is quite obvious that you can remove more adjacent bowel and probably more adjacent gland-bearing tissue by an end to end anastomosis, than by the two stage procedure. I would be inclined to accept the increased operative risk if such increased operative risk existed (and certainly figures that we have been shown tonight do not indicate that there is any increased operative risk) if the end results could be made better by a further resection.

I do not know of any figures that are quite so illuminating or are better than the figures Dr. Campbell has shown us this evening. As he mentioned and as he stressed throughout his presentation, undoubtedly the results which he has obtained are the results not only of careful selection but of exceedingly meticulous care, not only in the preparation of the individual for operation but through and after the operation. The only possible hazard that might result from such procedure and such care would be the exposure of the patient to the pulmonary complication of a prolonged operation.

Last of all, a thing that is not so commonly mentioned or stressed is the idea that we should not go to the operating room with the idea of performing an operation of any specific type. We should be prepared to utilize the best method that is available. We should accept the conditions as we find them and be prepared to use this as well as the other methods of surgery.

Dr. S. R. MAXEINER: In surgery of the large intestine, one must continually bear in mind the difference in the character of the bowel content of the right and left colon together with the fact that eight times as many growths involving the left side of the large bowel are obstructive in their nature. Therefore, one stage resection is much more applicable to carcinomas of the right colon.

Operative results will depend a great deal on the thoroughness of preoperative preparation. In the presence of obstruction, this is obviously impossible and as a result, the first indication is to decompress the bowel. The recent work of Devine¹ of Australia proves beyond possible doubt that even the grossly obstructed distal colon can be adequately prepared by

the new type of gun barrel colostomy which he recommends. He irrigates through the colostomy for three or four weeks in malignancies of the colon and for a period of months for inflammatory diseases, perforated diverticuli, etc., in the latter instance with almost complete sterilization of the defunctioned distal loop.

The Lahey modification of the Paul resection in which the entire right half of the colon is removed, in which the ileum is anastomosed to the colon by the clamp method with immediate removal of the growth by the obstructive technic advocated by Rankin, has proved so successful in our hands without any mortality to date, that we have been reluctant to employ the one stage operation. We have been able to put the stages of resection, clamp anastomosis and closure of the fistula so much closer together that we have greatly shortened the patient's stay in the hospital and aided him materially from the economic standpoint. Our personal opinion is that the choice of a one or multiple stage operation must be decided upon after the abdomen is opened. Adequate exploration determines its feasibility. It is quite desirable that the one stage operation which shortens the patient's stay in the hospital and obviates the necessity of multiple operations should be employed when the indications for its use are present but we do not feel that it is applicable in the presence of obstruction or infection. Lahey, Crile, Moynihan and Rankin advocate the one stage procedure in suitably selected cases.

The use of the Parker-Kerr or Rankin technic of aseptic anastomosis has been of great value in the successful outcome of the one stage operation. However, in one's decision it is well to bear in mind the statement of Rankin,² "It is now generally agreed that graded procedures in surgery of the colon and rectum enhance markedly the final satisfactory outcome. That this must be accomplished frequently with disregard of the economic situation of the patient, and of the protests of both patient and physician against prolonging the convalescence, is unquestionable, and yet, ultimately to accomplish either cure or prolonged palliation must be the aim of all surgical procedures."

Rankin has recently published an article in which he recommends the one stage operation for cancer of the rectum. It is interesting to note, however, that he specifies that this operation must be done only when the colon can be adequately prepared and he has increased the number of days of preoperative preparation to seven.

I regret my inability to be present at the meeting of the Minneapolis Clinical Club tonight to hear Dr. Campbell's discussion. I wish to thank Dr. Campbell for again bringing the one stage operation to our attention.

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2. Rankin, Fred W.: *Textbook of Surgery*, Phila., W. B. Saunders Co., 1936.

Dr. Donald McCarthy presented a paper on "The Relationship of Trauma and the Development of Subsequent Cardiac Conditions." This was discussed by Mr. P. C. Reynolds (by invitation), Dr. H. L. Ulrich and other members of the society.

L. R. BOIES, M.D., *Secretary*

VAN METER PRIZE AWARD

The American Association for the Study of Goiter again offers the Van Meter Prize Award of Three Hundred Dollars and two honorable mentions for the best essays submitted concerning original work on problems related to the thyroid gland. The competing essays may cover either clinical or research investigations; should not exceed three thousand words in length; must be presented in English; and a typewritten double spaced copy sent to the Corresponding Secretary, Dr. W. Blair Mosser, 133 Biddle St., Kane, Pennsylvania, not later than April 15th, 1939.

A place will be reserved on the program of the annual meeting for presentation of the Prize Award Essay by the author if it is possible for him to attend. The essay will be published in the annual Proceedings of the Association. This will not prevent its further publication, however, in any journal selected by the author.

Future Meetings

NORTH DAKOTA STATE MEDICAL ASSOCIATION

The North Dakota State Medical Association will hold its annual meeting in Fargo, at the City Auditorium, May 8, 9, 10. The tentative program follows below.

TENTATIVE PROGRAM

May 8, 1939

MORNING SESSIONS

- 9:00 Diagnosis and Management of the Surgical Gallbladder. Dr. E. M. Jones, St. Paul, Minn.
- 9:45 Paper on Obstetrics. (Title to be announced later). Dr. J. H. Moore, Grand Forks, N. D.
- 10:15 View exhibits.
- 10:30 Paper on Obstetrics. (Title to be announced later). Dr. Ralph A. Reis, Chicago, Ill.
- 11:15 Syphilis: Problems of Latent and Wassermann-fast Syphilis. Dr. H. E. Michelson, Minneapolis, Minn.

AFTERNOON SESSIONS

- 2:00 Dermatology for the General Practitioner. Dr. H. E. Michelson, Minneapolis, Minn.
- 2:45 New Methods in the Treatment of Gonorrhea in the Male and the Female. Dr. L. W. Larson, Bismarck, N. D.
- 3:15 View exhibits.
- 3:30 Diagnosis and Treatment of Eye, Ear, Nose and Throat Conditions Which are of Particular Interest to the General Practitioner. Dr. A. D. McCannel, Minot, N. D.
- 4:15 Proctology. (Title to be announced later). Dr. L. A. Buie, Rochester, Minn.

May 10, 1939

MORNING SESSIONS

- 9:00 Emergency Orthopedic Problems. Dr. H. J. Fortin, Fargo, N. D.
- 9:45 Surgical Paper. (Author and title to be announced later).
- 10:30 View exhibits.
- 10:45 Pediatric Paper. (Author and subject to be announced later).
- 11:15 Cardiac Emergencies. Dr. F. J. Hirschboeck, Duluth, Minn.

AFTERNOON SESSIONS

- 2:00 Tuberculosis. (Title to be announced later). Dr. G. A. Dodds, San Haven, N. D.
- 2:45 Hypertension. Dr. S. Marx White, Minneapolis, Minn.
- 3:30 View exhibits.
- 4:00 Diagnosis and Treatment of Gastro-intestinal Hemorrhage. Dr. F. J. Hirschboeck, Duluth, Minn.

SOUTH DAKOTA STATE MEDICAL ASSOCIATION

The South Dakota State Medical Association will meet in Aberdeen, April 24, 25, 26.

MEDICAL ASSOCIATION OF MONTANA

The Medical Association of Montana will meet in Butte at the Finlin Hotel, June 28, 29, 30. During the same week, June 26-27, a Montana Public Health Association meeting will be held.

AMERICAN ASSOCIATION FOR THE STUDY OF GOITER

The annual meeting of the American Association for the Study of Goiter will be held in Cincinnati, Ohio, May 22, 23, 24. The program for the meeting will consist of scientific papers dealing with goiter and other diseases of the thyroid gland, dry clinics conducted by guests of the association and operative clinics in the various hospitals in Cincinnati.

AMERICAN COLLEGE OF SURGEONS

There will be a sectional meeting of the American College of Surgeons at Winnipeg, Manitoba, March 29, 30, 31. Fellows of the College from Minnesota, South Dakota, North Dakota, Saskatchewan, Alberta, western Ontario and Manitoba will meet at the Fort Garry Hotel, Winnipeg. The executive committee on local arrangements is composed of J. A. Gunn, M.D., O. S. Waugh, M.D., G. S. Fahrni, M.D., J. D. McQueen, M.D., C. W. Burns, M.D., W. A. Gardner, M.D., R. B. Mitchell, M.D.

News Items

A change in the name of the South Dakota Public Health Association, which each year directs the sale of Christmas seals, was announced after the annual meeting in Madison, South Dakota. Henceforth it will be known as the South Dakota Tuberculosis Association.

Dr. Jennings C. Litzenberg, Minneapolis, has been elected president of the staff of Eitel hospital.

Dr. Herbert Carlson, chest surgeon at the state tuberculosis sanatorium at Ah-Gwah-Ching, Minnesota, was elected president of the Upper Mississippi Medical society at its annual meeting held in January in Brainerd, Minnesota. Other officers include: Dr. B. W. Kelly, Aitkin, first vice-president; Dr. Virgil E. Quanstrom, Brainerd, second vice-president; Dr. Fred Holst, Little Falls, third vice-president; Dr. G. I. Badeaux, Brainerd, secretary-treasurer.

Dr. H. J. Skarshaug, Fargo, North Dakota city health officer for the last three years, has resigned his position there and gone to Colorado to practice medicine.

(Continued on page 120)

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Dr. J. D. Alway, Aberdeen, South Dakota, was elected president of the Aberdeen District Medical society at the meeting held February 14, 1939. Other officers are: Dr. Paul V. McCarthy, vice-president, and Dr. Frank Cooley, secretary-treasurer.

Dr. R. E. Leigh, Grand Forks, North Dakota, has been elected president of the Grand Forks District Medical society. He succeeds Dr. C. J. Glaspel, Grafton. Other officers are: Dr. N. A. Hardy, Minto, vice-president; Dr. R. A. Mahowald, Grand Forks, secretary; Dr. R. O. Goehl, Grand Forks, treasurer.

Dr. Roy V. Morledge, Billings, Montana, was elected president of the Montana Academy of Ophthalmology and Oto-Laryngology at the semi-annual convention of the Academy February 6, 1939. Dr. Ashley W. Morse of Butte was reelected secretary-treasurer.

Dr. L. G. Dunlap, Anaconda, Montana, was named president of the St. Ann hospital medical staff at the annual meeting held February 7, 1939. He succeeds Dr. J. L. O'Rourke. Other officers elected are: Dr. W. E. Long, vice-president, and Dr. O'Rourke, secretary-treasurer.

Dr. Robert F. Werner, International Falls, Minnesota, has been appointed county physician to succeed Dr. C. C. Craig.

Dr. John Thabes, Jr., Brainerd, Minnesota, was elected chief of staff of St. Joseph's hospital recently. Dr. O. E. Hubbard was named vice-chief and Dr. V. E. Quanstrom, secretary-treasurer.

Dr. Leila Gorenflo of Cass Lake, Minnesota has accepted an appointment at the state sanatorium at Ah-Gwah-Ching.

Dr. C. T. McEnaney, Owatonna, Minnesota, has been named president of the Steele County medical society.

Dr. R. L. Page, St. Charles, Minnesota, was elected president of the Winona County medical society at the annual meeting held in January. He succeeds Dr. Robert Tweedy of Winona.

Dr. J. L. Devine, Jr., Minot, North Dakota, a graduate of Georgetown Medical School in 1937, has become associated with his father, Dr. J. L. Devine of Minot, in the practice of medicine and surgery.

Examination of candidates for appointment to the grade of assistant surgeon in the U. S. Navy medical corps will be held May 8 throughout the nation, according to word received by A. T. Harrison, naval recruiter at Butte, Montana. The tests will be limited to candidates who have completed or are about to complete internships in civilian hospitals. Candidates must be between the ages of 21 and 31 and must be graduates of class A medical schools. Successful candidates will be given the grade of assistant surgeon and the rank of Junior Grade Lieutenant. Full information may be obtained from the Bureau of Medicine and Surgery, Navy department, Washington, D. C.

Dr. C. C. Rand, who has practiced medicine in Crystal, North Dakota, the past six years, has become affiliated with Doctors C. R. Tompkins and G. L. Countryman in Grafton, North Dakota.

Dr. F. T. Sorum, formerly of Norton, West Virginia, is now practicing in Garretson, South Dakota.

Dr. G. A. Sarchet, Mobridge, South Dakota, was elected president of the Northwest District Medical society at the organization's annual meeting. Dr. W. A. George of Selby was elected vice-president and Dr. C. L. Olson of McIntosh, secretary-treasurer.

Dr. E. E. Novak, New Prague, Minnesota, has been elected a member of the board of regents of the University of Minnesota.

Dr. S. T. Sandell of Deer River, Minnesota, has accepted a position at the Glen Lake sanatorium in Oak Terrace. Dr. Sandell, who was formerly associated with Dr. H. E. Binet in Grand Rapids, Minnesota, left last October for Deer River to take over the practice of Dr. A. M. Boe.

Dr. H. T. Sherman, formerly of Plainview, Minnesota, has moved to Spring Valley, Minnesota.

According to the annual report of the Butte, Montana, Anti-Tuberculosis society, clinical examinations, held twice weekly, totaled 1,378 during the year 1938, an average of 115 a month or slightly more than 26 each week. Both children and adults are included in these examinations which are financed in part from the funds received each year during the Christmas seal sale campaign.

The American Physicians' Art Association composed of members in the United States, Canada, and Hawaii, will hold its second Art Exhibit in the City Art Museum of St. Louis, May 14-20, 1939, during the annual session of the American Medical Association. Art pieces will be accepted for this art show in the following classifications: (1) oils both (a) portrait and (b) landscape; (2) water colors; (3) sculpture; (4) photographic art; (5) etchings; (6) ceramics; (7) pastels; (8) charcoal drawings; (9) book-binding; (10) wood carving; (11) metal work (jewelry). Practically all pieces sent in will be accepted. There will be over 60 valuable prize awards. For details of membership in this association and rules of the exhibit, kindly write to Max Thorek, M.D., secretary, 850 Irving Park Blvd., Chicago, Illinois, or F. H. Redewill, M.D., president, 521-536 Flood Bldg., San Francisco, California.

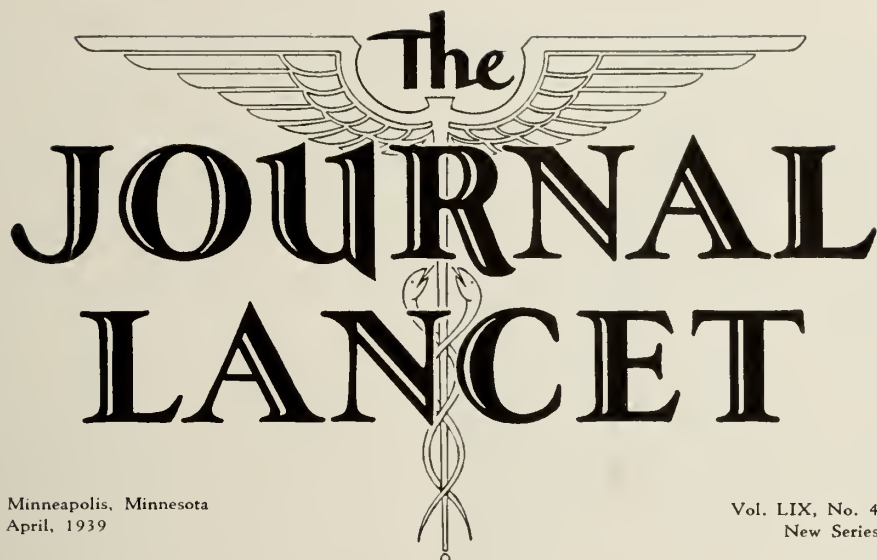
Neurology

Dr. Charles J. King, 59, of Langdon, North Dakota, died January 31, 1939. Dr. King had practiced in Langdon since 1932. From 1913 to 1931, he practiced in Columbus, North Dakota.

Dr. George W. Potter, 64, of Redfield, South Dakota, died February 15, 1939.

Dr. Aslak M. Boe, 40, Northfield, Minnesota, died January 8, 1939. Dr. Boe was graduated from the University of Minnesota medical school in 1925. He practiced medicine in Minneapolis until he went to Deer River in 1937. He practiced there until ill health necessitated his return to Northfield in October, 1938.

Dr. W. E. Patterson, 56, Westbrook, Minnesota, died January 15, 1939. He had practiced in Westbrook since 1918.



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New Series

The Early Diagnosis Campaign

Kendall Emerson, M.D.†
New York City, New York

For the past eleven years, the National Tuberculosis Association has promoted an Early Diagnosis Campaign during the month of April. It deals with the key which alone can solve the riddle of tuberculosis control. The disease is passed along by direct infection from one person to another. It is an endless chain unless you break it. Fortunately, however, this is possible during the period between infection and the development of disease in communicable form. When a case is discovered and isolated during this period, the chain is broken and no more infection occurs.

Early discovery of infection is a game of wits. The tubercle bacillus is relentless but without wit. The human race has wit but is indolent. Add to our wit a touch of the relentlessness of our enemy and he has no chance of survival.

The best use to which man can put his predatory instincts is the ruthless pursuit of hidden disease. The hunting in the field of tuberculosis is unusually good. We have an increasingly efficient public health service with a tuberculosis control program well underway in places, developing in others. Health education has aroused intelligent public interest in the campaign. The general practitioner is recognizing as sound teaching that early diagnosis is our most effective weapon and he sees the patient first.

The strategy of the Early Diagnosis Campaign is to coördinate the forces in the field and form a united front in the fight to eradicate human tuberculosis.

†Managing Director, National Tuberculosis Association.

Fluoroscopy of the Lungs*

A Method for the Diagnosis of Early Tuberculosis

R. H. Stiehm, M.D.†

Madison, Wisconsin

THE use of the fluoroscope in the diagnosis of tuberculosis, and especially early tuberculosis, has both its proponents and its opponents; at the present time, the latter greatly predominate. That it is far superior to the physical examination in finding pulmonary tuberculosis has been shown by the work of Fellows and Ordway,¹ Reid,² and Hetherington.³ That it compares favorably to the single postero-anterior roentgenograms of the chest is generally questioned, and no one to date has suggested that the small lesion not visible in the single postero-anterior roentgenogram or even in stereoscopic postero-anterior roentgenograms might be found by fluoroscopic examination. Four such cases will be presented.

Hetherington and Flahiff³ in their conclusions state, "Tuberculous infiltration limited to the apex of the lung above the clavicle is seldom recognizable by fluoroscopic examination." This has not been our experience. Hetherington states,⁵ however, that the Patterson "B" type screen was not used in his reported study.

That many are skeptical of the value of the fluoroscope in diagnosing early tuberculosis is emphasized by a questionnaire sent to 12 roentgenologists by Pohle,⁴ the questions and answers of which follow:

1. Do you believe that beginning tuberculous lesions in the lungs can be detected by fluoroscopic study as early as by good roentgenograms either flat or stereoscopic?

Ten of the answers were "No". One, "Absolutely no." One, "Possible in most cases."

2. Do you believe that in those cases found negative on fluoroscopic study there are some that would show small lesions if examined by flat or stereoscopic roentgenograms of the chest?

Eleven of the answers were "Yes". One said, "Yes, but only in a small number."

3. If your answer to question 2 is in the affirmative could you give me an approximate percentage of small lesions which may be overlooked by fluoroscopic examination?

One answered "50 per cent." One, "25 per cent." The others did not attempt to answer the question.

4. Does fluoroscopic examination, in your opinion, constitute a satisfactory and reliable method for progress study in early cases of tuberculosis of the lungs diagnosed by roentgenograms?

Ten answered "No". Two evaded the question.

The following additional remarks were appended to some of the questionnaires:

*From the Department of Student Health, University of Wisconsin.

†Assistant professor of clinical medicine, University of Wisconsin.

"There is nothing more dangerous or misleading than reliance upon a fluoroscope for diagnosis of early tuberculosis. It misses just the cases that are most amenable to treatment. Single films usually suffice."

"It is absurd to expect fluoroscopy to give the detail that one gets in a good film. A man would have a wonderful memory to be able to say 'A faint shadow is more or less faint than it was six months ago.' To depend on the fluoroscope for diagnosis or follow-up of early tuberculosis would be to turn back to the days before radiographs were made."

"The fluoroscope is utterly inadequate for the supervision of tuberculous infiltrations both because it is not exact enough and because a permanent record is essential for accurate comparisons of lesions from time to time." Pohle⁴ in his article remarks: "As will be shown later we found ourselves in full accord with leading radiologists in this country."

The questionnaire fails to inquire as to the type of fluoroscopic tube and screen used, or the studies made on which the beliefs and opinions expressed were based. Without the advantage of a fine focus tube and the Patterson "B" type screen, judgment of fluoroscopy in finding the early tuberculous lesion should be deferred. Obviously, conclusions, unless the same equipment is used, will be as varied as the types of apparatus.

As concerns question four, the fluoroscope cannot and probably never will be used as a reliable method for studying the progress of a lesion. In regard to the other questions, the status of the fluoroscope in the discovery of small parenchymal infiltrations must await many more comparative studies by interested physicians. The prediction is made that when this has been done the fluoroscope will receive a higher evaluation in finding the early lesion than it now enjoys. This is not to imply that discovery of early tuberculosis can be done by the physician who has not had sufficient and adequate training or experience, or that occasionally a small infiltration will miss detection. To compensate for those cases escaping detection on fluoroscopy will be those not visible in the routine single or even stereoscopic films, but clearly discernible by "spot" films taken with the patient in the position in which the lesion is most clearly seen by fluoroscopy. This, it will probably be found, can conveniently and effectively be done by attaching a cassette to the fluoroscopic screen holder, and taking a film with the aid of a hand timer when the fluoroscopic examination is being done.

Since expense is of necessity a consideration in tuberculosis programs where large numbers are concerned, the fluoroscope has been used as a method of re-examination for all students infected with tuberculosis as shown by

a positive Mantoux test. The first examination consists of a single postero-anterior film of the chest taken at the time of enrollment, or subsequently when the Mantoux test becomes positive when the annual retest is given. By this method of follow-up, 42 cases of tuberculosis developing subsequent to the time of enrollment (not including five cases of pleurisy with effusion) 84 per cent have been found by fluoroscopy while still in the minimal stage, and none were far advanced. Stereoscopic films are taken of all cases found by fluoroscopy.

METHOD OF EXAMINATION

Having determined that the individual is not too largely proportioned to permit a satisfactory fluoroscopic examination, it is important that a definite routine be followed. The examiner should accommodate his eyes by wearing goggles before entering the fluoroscopic room, and at all times when entering a lighted room. He should arrange his schedule so he may examine a specified group without often emerging from the fluoroscopic room. The subject is examined with the clothing removed to the waist, facing the fluoroscope, with the shoulders rotated forward, thus keeping the scapulae out of the field of vision. The entire thorax is first surveyed, noting any asymmetry. The neck is examined for calcified cervical lymph nodes. Any abnormality of the bony framework is noted, such as the presence of cervical ribs, and structural defects of the ribs and spine. The movement of the ribs and diaphragm is then observed, search especially being made for localized limitation of motion, presence of adhesions and the obliteration of the costophrenic angles. The heart, aorta, mediastinum, and retrocardiac space are next examined in the postero-anterior, anteroposterior, right and left oblique, and lateral views; and abnormalities noted. The hilum is then studied and the extent of its outer boundary noted. It should not normally extend beyond the inner third of the pulmonary field. Examination of the hila is probably the most unsatisfactory part of the examination, for though the hilum may appear "muddy" in certain parts, the density noted may not be sharply enough defined or sufficient enough in detail to tell definitely that it represents a calcified deposit. Distinction between blood vessels on end and calcifications slightly removed from the hilum is readily and easily made by rotating the patient.

Finally the lung fields are examined. With the shutters of the fluoroscope wide open a general survey of the lung is made. Any large infiltration is readily seen. With the shutter arranged to expose a three-inch strip of lung, homologous parts of the two lungs are compared by slowly turning the patient from side to side and slowly elevating the screen so that all parts of the lungs may successively be viewed. The apices, clavicular and subclavicular regions are closely inspected in all positions with the scapulae drawn both up and down, but always forward. Closer inspection of these important portions of the lung field should be done with the shutter of the diaphragm so regulated that only small parts of the lung can be successively examined. By inspiration and expiration the position of the ribs over the apices can be changed so that thickening of the apical pleura

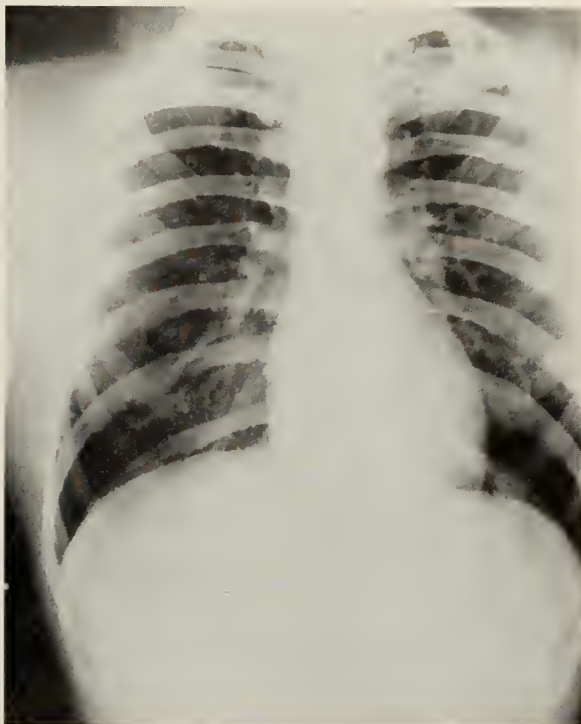


Fig. 1. Lesion obscured by clavicle.

or subminimal infiltrations at the extreme apices can be brought into view. Frequently these are not visible on films unless several are taken in various phases of respiration.

The entire routine is repeated while the patient faces the examiner. Since most infiltrations are in the posterior part of the lung, they usually appear larger in this position.

A COMPARISON OF EXAMINATIONS WITH THE FLUOROSCOPE AND WITH X-RAY FILMS

During October of 1938, to better compare and evaluate the two methods of examination, a group of over five hundred students who received the routine X-ray film of their lungs were also given a fluoroscopic examination. The complete statistical study has not been completed, but of especial interest are the four cases with small infiltrations not visible on the routine single postero-anterior films but found on fluoroscopy. Also of interest is the fact that no case of parenchymal tuberculosis found on films remained undetected by fluoroscopy, though small calcified deposits in the hilum were frequently not discernible by fluoroscopy. Attempts to examine an individual of unusual large proportions were not made. It should also be emphasized that though the examiner can find the small parenchymal infiltration, accurate detail as to the type of lesion can only be determined by the film.

CASE REPORTS

Case 1 is a male, age 17, height 70 inches, weight 146 pounds. Mantoux 12x12 mm. reaction to 0.00002 mg. P.P.D. Past medical history: No known contact. Pleurisy without effusion



Fig. 2. Small cavity extreme periphery of right first interspace.

in 1933. No symptoms. No fever during three-day observation. Physical examination: Essentially negative. Laboratory: Fasting gastric contents negative for tubercle bacilli on three successive mornings by stain and guinea pig inoculation. Sputum negative. Blood sedimentation index 1 mm. Hemoglobin normal. Total repeated counts of the white blood cells showed a continued leucocytosis above 12,000 with an average lymphocyte count of 21 per cent. The roentgenologist's report of the single film (Fig. 1) taken 9/20/38 follows: There are a few tiny granular shadows in the left apex. Might be advisable to check this chest with stereoscopic films.

Fluoroscopic examination of this patient on 10/11/38 showed minimal infiltration in the right first anterior interspace well out in the periphery with a 5 mm. cavity. Following fluoroscopic examination a "spot" film was taken, the X-ray report of which follows: This film shows a definite area of wedge-shaped infiltration at the periphery of the lung at the level of second right rib laterally. Also there is noted a minute area of rarefaction less than a half centimeter in size within this infiltration which probably represents a minute cavity. (Fig. 2).

The roentgenologist's report of stereoscopic films taken on 11/1/38 follows: The original film is not available for comparison, but in this study a definite area of soft infiltration can be seen at periphery of the right first interspace and there is also evidence of some strand-like infiltration at the left apex.

Case 2 is a male, age 17, height 69 inches, weight 119 pounds. Mantoux 18x18 mm. reaction to 0.00002 mg. P.P.D. No known contact. Father has chronic cough. Past medical history: Essentially negative. No known contact. Physical examination: Nothing pertinent. Temperature normal during a three-day observation period. Laboratory: Fasting gastric contents positive for tubercle bacilli by stain and guinea pig inoculation. Sputum negative. Blood sedimentation index 9 mm. Hemoglobin normal. White blood count showed no leucocytosis and a lymphocyte count of 30 per cent.

The roentgenologist's report of the film taken 9/27/38 (Fig. 3) was negative. Fluoroscopic examination done on 10/31/38 showed the right interlobar fissure to be thickened and the presence of minimal infiltration in the right clavicular region best seen in the oblique view. Stereoscopic films and a



Fig. 3. Lesion obscured by bony framework.

right anterior oblique view of the upper chest show a small infiltration in the right apex beneath the shadow of the first rib. The roentgenologist's report of "spot" films taken in the oblique view of the upper right chest show a well-defined area of infiltration in the first anterior interspace, and a thin linear shadow running out to the periphery at the level of third rib anteriorly. (Fig. 4 and 5).

Case 3 is a male, age 21, height 70 inches, weight 142. Mantoux negative to 0.00002 mg. P.P.D. 16x16 mm. reaction to 0.005 mg. P.P.D. Past medical history: Essentially negative. Physical examination showed nothing pertinent. Temperature normal. Laboratory: Fasting gastric contents positive for tubercle bacilli by guinea pig inoculation. Sputum negative. Sedimentation index 3 mm. Hemoglobin and red blood cell count normal. Repeated white blood cell count showed a normal total count with lymphocytes averaging 30 per cent. The roentgenologist's report of single film taken on 9/30/38 was negative. Fluoroscopic examination on 10/19/38 showed an infiltration in the left apical and clavicular regions with a small cavity at the level of the first rib anteriorly.

The roentgenologist's report of stereoscopic films taken on 10/20/38 follows: This study shows evidence of soft infiltration in the extreme apex and first interspace area on the left with in addition a small area of rarefaction hardly a centimeter in diameter directly on a level with the anterior arc of the first rib. The balance of this lung field is clear and no abnormality is noted on the right. The described changes are indicative of tuberculous infiltration at the left apex with probably small cavitation. Of especial interest in this case is the fact that the individual failed to react to the first strength tuberculin. This emphasizes the importance of giving a second stronger test where no reaction occurs to the first test. Of 71 cases of active tuberculosis found in the five-year period (1933-1938) 16, or 22.5 per cent, failed to react to the weaker test. The single strong dose is not advocated; but since in many case-finding programs the single weak dose alone is used, the fact should be emphasized that of over 15,000 students tested in the past five years, only 57 per cent of the infected would have been determined and 22.5 per cent of the active cases would not have been found. With the two-dose method 16.23 per cent (57



Figs. 4 & 5. Lesion easily visible in oblique position.

per cent of total positive) reacted to the first strength dose while an additional 12.24 per cent (43 per cent of total positive) reacted to the stronger test.

Case 4 is a female, age 19, height 62 inches, weight 123. Mantoux 11x11 to 0.00002 mg. P.P.D. History, physical examination and laboratory studies essentially negative. The roentgenologist's report of film taken 9/22/38 was negative. Fluoroscopic examination done 10/5/38 showed a small strand-like infiltration in right first anterior interspace visible in the right posterior oblique position.

The roentgenologist's report of stereoscopic films taken on 10/5/38 follows: The heart is normal in size, position, and contour. The peripheral lung fields including the extreme apices are well aerated. There is a slight amount of trunk accentuation possibly a little more noticeable in the right vertebral area, but without any definite areas of infiltration associated. The hilum shadows are within the limits of normal in extent. The diaphragms are at normal levels with clear sulci. Conclusion: This examination fails to demonstrate any definite evidence of parenchymal involvement. In view of fluoroscopic findings and the slight right apical trunk increase noted, progress studies may be advisable.

The report of a "spot" film taken in the right oblique view was: There is a question of some small strand-like shadows of infiltration in the plane of the first anterior interspace. It is difficult to be certain of this because of the overlying vertebral end of the fourth rib.

The shadow found in this case represents an old and probably inactive process of no import at the present time, but is included to indicate to what extent lesions not easily brought into view by a single stereoscopic study or even a single "spot" film can be seen by fluoroscopy.

SUMMARY

That the fluoroscope is not generally accepted as a diagnostic method for the discovery of early parenchymal tuberculous lesions is appreciated. Until further comparative studies are done, its status will continue to be in doubt. Though honest skepticism is commendable, expressions of opinion should be reserved until the fluoroscopic method is given a complete and thorough trial. That the method has value is indicated by the four cases of minimal pulmonary tuberculosis presented, which were not visible on the single postero-anterior film. The fluoroscope can be used to its greatest advantage by attaching a cassette holder to the screen, and taking a small "spot" film of the lesion discovered in the position in which it is most clearly discernible.

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The Tuberculin Reactor and Tuberculosis Control

Ellery P. Edwards, M.D.

Cleveland, Ohio

IN the Cleveland plan for tuberculosis control, an attempt is made to maintain a program which, if carried out consistently, should in the end practically eliminate the disease; a plan of attack which is feasible and reasonably efficient without being too elaborate or expensive. The economic cost of tuberculosis warrants considerable expense in order to break the endless chain of infection that involves each succeeding generation. However, plans for tuberculosis control are still too often made more or less by laymen and because they are not made with sufficient regard for the pathology and epidemiology of this disease, they lead to great and needless expense to little avail.

Cleveland, since 1906, has provided clinics where suspected cases may be examined free of charge or where known contacts to the disease are brought in routinely for examination for a period of time, in order to detect tuberculosis in the early stages if possible. This plan, which seems logical at first, has not succeeded as a means of finding early tuberculosis in too high a percentage of cases. It was noted that too many cases were known only a few days before death. In 1931, for example, 45.7 cases were known only sixty days or less before death. Little in the way of prophylaxis or treatment is practicable under these circumstances. The following is a report showing the time elapsing between report of case and death:—

	1931	1935	1936	1937	1938
6 months or more.....	330	307	320	273	257
3 to 6 months.....	86	66	66	66	42
1 to 3 months.....	140	79	85	79	43
Less than 1 month.....	210	209	177	138	139
Total deaths.....	766	661	643	558	507

This late reporting or late discovery is mainly due to the nature of the infection. It is characterized by (1) a long and variable latent or incubation period, (2) lack of characteristic signs or symptoms, (3) usually slow evolution of the pulmonary form.

The long incubation period makes it possible for contacts to travel half way around the world before clinical tuberculosis develops. This fact alone is a large factor in keeping the rates in all large cosmopolitan areas at about the same level. In Cleveland, at the 1930 census in a heavy tuberculosis area, 65.2 per cent were foreign born. Last year, in one large high school in this area, 75 per cent of the senior class were born in the south. Good preventive methods with locally born children still leave open the possibility of imported disease from severe exposure elsewhere.

The typical clinical signs of tuberculosis fail to lead to the discovery of pulmonary tuberculosis. Nutrition

is not affected in any but advanced cases. The height and weight standard is almost valueless in judging the health of children. Routine X-ray of tuberculosis contacts reveals that about 50 per cent of those with X-ray lesions are overweight. Rathbun's survey brought this out. Our surveys which are regular routine in high school find parenchymal lesions often in those who are overweight. Todd's studies in the Brush Foundation of the development of children reported that there were four distinct types of body structure. The two extremes were the slim "greyhound" type and the short broad type. In both types children were found to be like their antecedents in build. Both are equally subject to tuberculosis as well as to any other infection. The slim type is often suspected to be tuberculous without regard to tuberculin reaction. They are often found in nutrition classes and open air rooms. Closer study shows them to be normal children. On the other hand, children of grade school age whose roentgenograms show large paratracheal and hilum nodes indicating extensive tuberculosis of these nodes, may be overweight in spite of the tuberculosis. They may even gain weight normally although given no more protection than other children. However, at the menarche (12th to 15th year) the adult type of parenchymal involvement may suddenly be found in these contacts by routine X-ray or fluoroscopic examination.

CASUAL CONTACT VERSUS SEVERE EXPOSURE

Tuberculin sensitivity is occasionally of use in the diagnosis of tuberculosis. More often it is of value because of its absence as a means of excluding tuberculosis in the presence of other evidence of the disease. However, the positive tuberculin reaction is of greater use as a means of discovering tuberculosis contact to unknown sources of infection. This is especially true since bovine tuberculosis has been practically eliminated and our tuberculin standardized. The tuberculosis problem is perpetuated largely because each new generation is in turn infected from unsuspected sources. Adult exposure is significant but this also can be prevented by a systematic and persistent search for carrier cases. The fact that a child is a reactor means that somehow he has had contact with an open case of pulmonary tuberculosis sometime since birth. The longer that exposure lasts, the greater the probability that pulmonary disease will appear in the contact. Barclay's studies showed that if it lasted six months, 8 per cent of the contacts would have pulmonary tuberculosis. If exposure lasted twelve months or more, the proportion of secondary cases became 15.9 per cent. He also concluded that other factors such as poverty or intercurrent disease, etc., failed to change the figure. In other words, massive infection is the one consistent factor in producing pulmonary tuberculosis in the rising generation. Casual contact

produces pulmonary tuberculosis of clinical importance in less than 1 per cent. In Cleveland, with a population of 990,000, there were on file 4,984 cases December 31, 1938, with 507 pulmonary deaths for that year. If ten cases per death is the average ratio as Long has shown, then Cleveland's recorded cases at five thousand, although up to the theoretical number, still represent less than .5 per cent of the population whereas 75 per cent are reactors.

CARRIER FINDING

When a child of immature age is found to be a reactor, the next most important procedure is to search his immediate environment, i. e., his household, for a case of pulmonary tuberculosis. In Cleveland public and parochial schools, all children are given the Mantoux test in the first grade, and all adults in the household of positive reactors 12 years of age or over are fluoroscoped, either at clinics or by private physicians. About 7 per cent react to .1 mg. of old tuberculin (Trudeau Laboratory Product). This procedure has been carried on since 1933 and has been the means of finding many true carriers. In 1938, 224 cases of pulmonary tuberculosis were found in this manner, one third of which were classified as minimal, the rest moderately advanced or far advanced. About 60 per cent of the parents consent to the test. This proportion is much greater in some areas where educational work is done.

TUBERCULIN TESTING				
Parochial Schools—First Grade				
Year	No. Enrolled	No. Accepting	Pct.	Reacting
1932-33	4893	2632		6
1933-34	4691	2120		6
1934-35	4459	1971		7
1935-36	4056	2361		6
1936-37	4215	2394		6
Public Schools—First Grade				
Year	No. Enrolled	No. Accepting	Pct.	Reacting
1933-34		3950		7.2
1934-35	9006	4497		7.4
1935-36	9101	7842		7.5
1936-37	9041	5274		6.9

EARLY DIAGNOSIS IN THE ADOLESCENT CONTACT

The tuberculin test is also useful as a means of eliminating non-contacts. The school health service must routinely search for pulmonary tuberculosis lest anyone with that disease be found in school. This search should begin at about the twelfth year, or at the seventh grade, which is the first year of Junior High School. The examination must be done with X-ray if it is to be worth while. It is impractical and unnecessarily expensive to X-ray every child yearly. The tuberculin test given routinely screens out the contacts, a relatively simple procedure. This eliminates about 75 per cent who need not be examined for tuberculosis.

In Cleveland, the Mantoux test is given routinely in the seventh grade to all students whose parents give written consent, and again in the tenth grade, to those previously negative or not tested. All boys taking part in major athletic sports are also required to have a tuberculin test. About 15 to 17 per cent in the seventh grade react to .1 mg. of old tuberculin and 25 per cent in the tenth grade. (See table for tuberculin testing in public and parochial schools).

PUBLIC SCHOOLS					
Seventh Grade			Tenth Grade		
Enrolled	Accepting	Reacting	Enrolled	Accepting	Reacting
10279	4046	17.9		1937	25.9
9573	3117	16.8	12265	1777	26.5
9550	6955	16.8	12439	3491	25.2
	6145	14.6	12093	3268	22.2
PAROCHIAL SCHOOLS					
(In mixed grades 531 tested—36% reactors)					
4975	1945	19.0	524	146	27.0
4796	1789	18.0	508	103	22.0
4741	2702	16.0	558	258	25.0
4841	2319	17.0	529	172	28.0

All positive reactors are listed for fluoroscopic examination, most of which is now done with a regular fluoroscope mounted in a trailer which is loaned by the local tuberculosis association. By this examination they are divided into three groups: (1) normal findings, (2) some pathology, probably non-tuberculous for observation, (3) X-ray advised, tuberculosis suspected. The findings for the school year 1937-38 follow:

Grade	Fluoroscopic Examination			X-Ray				
	No. Exam.	Normal	Other Pathology	TB Suspected	No Manifest	Childhood Type	Minimal	Mod. Advanced
7 to 9	3162	2254	828	80	52	13	12	3
10 to 12	3514	2420	976	118	70	25	17	6
Total	6676	4674	1804	198	122	38	29	9

An important feature of the fluoroscopic examination is the educational value which can be appreciated only by seeing the behavior of the children in the dark room. The picture of the thoracic cage and heart is impressive to them. They ask many good questions and become X-ray-minded regarding chest examinations. Reports of the findings are kept secret and disclosed only to their private physicians or to chest clinics for advice. Positive cases are of course excluded from school. The fluoroscopic procedure can be carried out at the rate of about fifty per hour with the help of two assistants. Each child enters the dark room with a card on which is his name, address, and age. At examination this card is filed according to findings in one of three groups. No dictation or description of findings is made before the children for obvious reasons. Four to six are taken into the dark room at a time partly that they may see each other's chests and know that the examination is bona fide.

ELIMINATION OF NEGATIVE CASES

A considerable part of the work of tuberculosis control is the prompt recognition and elimination of negative cases. Here the tuberculin test of both patient and child contacts, when negative, saves untold amounts of needless work and visits by the nurse. In the past, suspects were followed by the Health Department for years because somehow they had been diagnosed pulmonary

tuberculosis. The diagnosis probably was warranted because of clinical symptoms, but negative sputum and negative tuberculin reactors in the home subsequently found often make it safe to discharge the case in a reasonable time. Migrating tuberculosis contacts can also be found by testing all newcomers in the public schools and fluoroscoping the families of reactors. Constant vigilance on the part of the Health Department for open cases from elsewhere is as important as from its own known cases. In fact, a community may get most of its cases from such sources; apparently that is true of Cleveland today.

Using tuberculin sensitivity as a means of locating carriers and of finding early cases of pulmonary disease

in the adolescent child without exorbitant cost has been demonstrated in Cleveland. The small and slowly decreasing number of reactors in the first grade, also in the high schools, the low morbidity and mortality in both sexes below the 35-year age limit, and the drop in unreported cases and late reported cases all support the theory that a consistent use of this method of attack should in about ten years make tuberculosis a relatively rare disease. The fewer cases there are in a community, the more necessary it is for tuberculin testing of children to locate them. Tuberculin testing eliminated tuberculosis among cattle. It can do the same for man using the reaction as a means of finding tuberculosis in the child's environment rather than in the child himself.

A Comparison of the Intermediate and the Two-Dose Tuberculin Tests

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THE value of the tuberculin test in screening out tuberculous students is recognized in health programs in high schools and in colleges. In actual practice the administration of the test offers few serious drawbacks. The two more serious problems are the labor involved in giving and reading the tests, and the failure of students to return for reading the test, knowing that if the first is negative they will be given a second. To reduce both of these difficulties, a single test dose has been used.

Soon after the purified protein derivative tuberculin was introduced, Stiehm¹ at the University of Wisconsin gave 274 students only the second dose (0.005 mgm.) with 10 per cent of four-plus reactions compared with less than 1 per cent by the two-dose method. Hall² reported 4,511 cases of school children to whom he gave an intermediate dose 25 times the size of the usual first dose, or 0.0005 mgm., and found 22.7 per cent of positive reactors with only four, or 0.39 per cent, of four-plus reactions. In making these observations, he ran a control group of 101 children to whom he gave both the single intermediate and the two-dose tests. He concluded that the intermediate dose does not miss any significant positive reactors. Using the same size dose, Husband and Loy³ in the summer of 1937 tested 117 Four-H Club contestants and found 14.9 per cent of positive reactions compared with 9.2 per cent of positives in a group of 141 young people tested the preceding year with 0.1 mgm. of old tuberculin.

Fully conscious of the fact, from previous experience, that four-plus reactions cause unfavorable attitudes

toward tuberculin testing, but also conscious of the need for reducing the amount of labor involved and for decreasing the number of students who fail to return for the second test, we commenced in September 1936 using both a single intermediate and a two-dose test, hoping to arrive at some definite conclusion as to the efficacy of the single intermediate dose. We were of the opinion that the intermediate dose of 0.0005 mgm., which is 25 times the size of the regular first dose, would produce too many severe reactions. Consequently we started with an intermediate dose ten times the usual first dose, or 0.0002 mgm. With this, we tested approximately one-half of the new students entering the University of Kansas in September 1936. The remainder of the group was tested with the regular two-dose method. In September 1937 we again tested one-half of the new students with the regular two-dose test and one-half with a larger intermediate dose 25 times the regular first dose, or 0.0005 mgm. In an attempt to determine how many significant tuberculin-sensitive students were missed by the single dose, we tested one-half of the new students in September 1938 with the intermediate dose of 0.0005 mgm. and retested the negative reactors with the usual second dose of purified protein derivative. The other half of the group was tested with the regular two-dose test.

There was no pre-arranged selection of the students in any group. Appointments for physical examinations are made at the time of registration and, except for late registrants, students are taken in accordance with a rotating alphabetical schedule. Since the freshmen students were predominant the first two or three days of

†Health Service, University of Kansas.

TABLE I

Intermediate single dose	1936-37		1937-38	
	1 Dose 0.0002 mgm.	2 Dose	1 Dose 0.0005 mgm.	2 Dose
Regular 2 Dose:				
Dose I		0.00002 mgm.		0.00002 mgm.
Dose II		0.005 mgm.		0.005 mgm.
Number tested	786	681	617	699
Total positive	139	207	100	302
Per Cent Positive:				
Dose I		11.6		9.58
Dose II		18.79		33.619
Total	17.68	30.39	16.2	43.20
No. Primary Tuberculosis:				
Dose I		76		41
Dose II		110		186
Total	121	186	69	227
No. Secondary Tuberculosis:				
Dose I		2		1
Dose II		1		3
Total	4	3	3	4
Pct. Secondary Tbc	0.508	0.4405	0.486	0.5722
Four-Plus Reactions:				
Dose I		0		1
Dose II		0		2
Total	0	0	4	3
Pct. Four-Plus Reactions	0	0	0.648	0.429
Average Age in Years	19.763	19.108	18.85	19.84

registration and the upper class and graduate students more numerous the last day of registration, the age grouping of the first two days of testing tended to be lower than the last two. The method of administration of the tests was that now accepted as standard. During the course of the physical examination, a separate history was taken on each student, with emphasis on the possibility of previous exposure to known tuberculosis. The tuberculin was administered with the usual type of tuberculin syringe, and a platinum needle, flamed between tests. We found it desirable, when giving tests rapidly, to have two syringes, using first one and then the other, since the base of the needle may get hot enough to burn the patient. It is necessary for uniformity of tests to make sure that the entire needle is filled with solution each time before injecting. The same nurses gave the tests the three years and made the first readings. Tests showing any reaction were examined by physicians. The tests were read at the end of 48 hours. In September 1938 reactions suggesting vesiculation or necrosis were observed after another 48 hours, since it had been found that a four-plus reaction cannot always be so classified at the end of the first 48 hours.

The total number of students tested in the three years was 4108 — 1403 by the one-dose test, 1970 by the regular two-dose test, and 735 by the combination of the large, or intermediate, first dose and the regular second. Males made up 65 per cent of the group and females 35 per cent. The average age of the one-test group was 19.3 years, of the two-test group 19.72 years, and of the combined intermediate first and regular second dose 18.45 years. One hundred thirty-two were Negro, Indian or Filipino; the remainder were white. Eighty-five per cent were from Kansas and the adjoining states. In all groups approximately 75 per cent of the students came from towns of 2500 to 100,000 population; the remaining 25 per cent were about evenly divided between smaller towns and rural homes.

In September 1936, 27 students failed to complete their tests, in 1937 there were 76, and in 1938 there were 34. A small number withdrew from the University but the remainder failed to respond to telephone and written reminders.

To a single test dose of 0.0002 mgm. of purified protein derivative, ten times the usual first strength dose, 139, or 17.68 per cent, of 786 students reacted positively. Of the 139 so reacting, 121 showed evidence in the X-ray ** plates of their chests of primary tuberculous infection as indicated by Gohn tubercles and calcified tracheo-bronchial glands, 14 had normal appearing chests and 4 were found to have secondary or adult type tuberculosis. Two of these were proved to be active. (Table I.)

When the single dose was increased to 0.0005 mgm., or 25 times the usual first strength dose, 100, or 16.2 per cent of 617 students reacted positively. This group averaged 0.9 years younger than the preceding group. Of the 100 positive reactors, 69 showed X-ray evidence of primary tuberculous infection in the lungs, 28 had normal-appearing chests and 3 had definite secondary tuberculosis, one case being clinically active. (Table I.)

When the routine two-dose test was used, 79, or 11.6 per cent, of the 681 students tested in 1936 were positive on the first dose and 128, or 18.79 per cent, on the second, making a total of 207, or 30.39 per cent positives. Chest X-rays showed evidence of primary tuberculous infection in 186, normal chests in 18 and adult or secondary type of tuberculosis in 3, none of which proved to be active clinically. Two of the three cases were picked up on the first dose of tuberculin and the third was negative to the first test and positive to the second. (Table I.)

In 1937, 699 students were tested with the two-dose method. On the first dose 67, or 9.58 per cent, reacted positively, on the second dose there were an additional 235, or 33.619 per cent, making a total of 302, or 43.2 per cent. The average age of this group was 0.7 years older than the similar group tested in 1936. In the 302 reacting positively to the two-dose test in 1937, 227 showed X-ray evidence of primary tuberculous infection in the lungs, 71 showed normal-appearing lungs and 4 had secondary type of tuberculosis. One case was active clinically. This case was positive on the first dose. The other three were negative on the first test dose and positive on the second. (Table I.)

In 1938 the large intermediate dose of 0.0005 mgm. was used as the first test on 755 students. Those who reacted negatively were retested with the regular second dose of 0.005 mgm. The average age of this group was 18.45 years. The first dose produced 261, or 15.37 per cent, positive reactors and the second 20.14 per cent for a total of 35.51 per cent. X-ray examination showed evidence of primary tuberculous infection in 234, normal chests in 6 and secondary tuberculous infection in 5, of which two were proved to be active clinically. The rest of the new students, 590, were tested with the regular two-dose test. The first dose showed 12.71 per cent positive reactors and the second 34.92 per cent for a total of 47.63 per cent. The average age was 20.216 years due to the increasing enrollment of upper class and graduate students. X-ray evidence of primary tuberculosis appeared in 217, normal-appearing chests were

TABLE II

	1938	
	Combined	Regular
Combined dose: Intermediate first..	0.0005 mgm.	
Regular second	0.005 mgm.	
Regular two dose test:		
Dose I		0.00002 mgm.
Dose II		0.005 mgm.
Number tested	735	590
Total positive	261	281
Per cent positive:		
Dose I	15.37	12.71
Dose II	20.14	34.92
Total	35.51	47.63
No. primary tuberculosis:		
Dose I	102	60
Dose II	132	157
Total	234	217
No. secondary tuberculosis:		
Dose I	4	3
Dose II	1	2
Total	5	5
Per cent secondary tuberculosis	0.68	0.847
Four-plus reactions:		
Dose I	10	1
Dose II	0	3
Total	10	4
Per cent four-plus reactions	1.36	0.676
Average age in years	18.45	20.216

reported in 16 and secondary tuberculous infection in 5. None of these have been proved active to date. (Table II.)

In the three years of testing by the single intermediate dose, the combined intermediate and regular second dose, and the regular two-dose test, 24 cases of secondary or adult type of tuberculosis were found in normal-appearing students. The lung findings were insufficient to make a diagnosis by physical examination alone. Seven cases were isolated by the single-dose method, five by the combined test and twelve by the two-dose test. Three of the seven found by the single intermediate dose had clinically active tuberculosis, two found on the first dose of the combined test were active and one found by the regular two-dose test was active clinically. Among those positive to the second dose of the two-dose test six had evidence, as shown by the X-ray, of secondary tuberculosis but none were active.*** On the second dose of the combined test there was one diagnosed as adult type tuberculosis with no confirmatory evidence of activity. The incidence of secondary tuberculosis was 0.508 per cent in the small intermediate test group, 0.486 per cent in the larger intermediate test group and in the total two-dose group 0.609 per cent. In the combined test group, the incidence was 0.544 per cent with the first dose and 0.68 per cent by both tests. (Table III.)

The small intermediate dose of 0.0002 mgm. produced no four-plus reactions. The larger intermediate dose of 0.0005 mgm. produced four, or 0.648 per cent four-plus reactions. There were two four-plus reactions in the

TABLE III

	Single Dose 0.0002 mgm.	Single Dose 0.0005 mgm.	Combined	Regular
			Dose I, 0.0005 mgm.	Dose II, 0.0005 mgm.
No. of students tested	786	617	735	1970
No. of positive reactors	139	100	261	790
Pct. of positive reactors	17.68	16.2	35.51	40.1
No. of adult tuberculosis	4	3	5	12
Pct. of adult tuberculosis	0.508	0.486	0.68	0.609
No. of four-plus reactors	0	4	10	7
Pct. of four-plus reactors	0	0.648	1.36	0.355

first of the regular two-dose test and five in the second, making a total of seven, or 0.355 per cent. With the combined doses there were ten four-plus reactions on the first dose (0.0005 mgm.) and none on the second (0.005 mgm.), making a total percentage for this method of 1.36. (Table III.)

SUMMARY

In three years of tuberculin testing covering a total of 4108 students, an average of 16.94 per cent of positive reactors was isolated with a single intermediate dose and 40.1 per cent with the regular two-dose test.

The incidence of adult type of tuberculosis was 0.512 per cent with the intermediate dose and 0.609 per cent by the regular two-dose method.

There were no four-plus reactions with the small intermediate dose of 0.0002 mgm. The incidence of four-plus reactions with the intermediate dose of 0.0005 mgm. was 1.004 per cent and with the routine two-dose test 0.355 per cent.

Retesting the negative reactors to the large intermediate dose with the regular second dose increased the positive reactors in a group of 735 students from 15.37 per cent to 35.51 per cent and the incidence of secondary tuberculosis from 0.544 per cent to 0.68 per cent, representing one additional inactive case.

The incidence of secondary tuberculosis determined by use of the smaller intermediate dose of 0.0002 mgm. was 0.508 per cent and by the larger intermediate dose of 0.0005 mgm., 0.515 per cent.

**All X-rays were read by Dr. G. M. Tice, University of Kansas Hospitals.

***Isolation of tubercle bacilli from sputum or stomach contents was used as the final test of activity.

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Results of Fluoroscopic Examination of Positive Tuberculin Reactors in Peiping Middle Schools*

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THE "Early Diagnosis Campaign" has for the last ten years been the main plan of the anti-tuberculosis platform of America. The basis of the campaign has been the education of school children and others in the recognition of "the early symptoms" of tuberculosis. And yet Amberson¹ states that from 60 to 70 per cent of intelligent American persons are unaware of the presence of tuberculosis in their lungs until the lesions are moderately or far advanced. There are no "early symptoms" of tuberculosis in these cases. We are led to believe that in China the percentage of such cases is even larger, due to the high incidence of infection. Early diagnosis must be based on case-finding principles. A valuable method of case-finding is tuberculin testing followed by the fluoroscopic and radiographic examination of positive reactors.

This paper summarizes the results obtained from the fluoroscopic examination of 737 girl and 603 boy students of three large middle schools in Peiping, all of whom reacted positively to tuberculin. All the fluoroscopic examinations were made by the writer. Fifteen minutes was allowed for accommodation and the students were examined in batches of from ten to fifteen, with rest intervals between each group.

The examination of each student is made in a systematic manner. First the contour and movement of the diaphragm are examined through a horizontal slit of the visual field. Next, with the diaphragm changed to a vertical slit a general survey and comparison of the two sides is made. The diaphragm is then closed to a small rectangle and both apices, and the hilum region receive careful attention, rotating the subject throughout the examination. Lesions and especially calcified lesions in the hilum nodes can frequently be seen with the patient in the oblique position though they are invisible in the anteroposterior plane.

Previous reports of X-ray findings of the chests of "healthy" Chinese individuals have shown that calcified lesions were found much more frequently than they are reported from other countries.² In fact, it has been suggested that they were reported more frequently than they occurred and that fibrosed trunks and the cross-section of blood vessels were frequently reported as calcium. For this reason, particular and critical attention was paid to this point and unless the contour of a calcified mass was very distinct, it was not reported.

RESULTS

The results are summarized in Table I.

Calcium in the hilum: The large number of individuals showing calcium is apparent in this study, as it was in the radiographic study of Hall and Chang.²

*Presented before the American Academy of Physicians, San Francisco, July 18, 1938.

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TABLE I.

	Male		Female		Total	
	No.	Pct.	No.	Pct.	No.	Pct.
No. Examined	603	45	737	55	1340	100
Normal	35	5.8	62	8.4	97	7.1
Calcium in hilum	585	97	618	83.8	1203	90.4
Calcium in parenchyma	161	26.7	196	26.5	357	45.6
Clouding in parenchyma						
Right	6		15		21	
Left	4		3		7	
Both	4		4		8	
Total	14	2.3	22	2.9	36	2.6
Pleural changes	10	1.6	4		14	1.0
Suspicious findings	49	8.1	40	5.4	89	6.7

Pulmonary Nodules: Calcified nodules in the lung parenchyma were seen in 357 individuals, 161 boys and 196 girls. In some cases more than one nodule was seen in the same individual and a total of 426 nodules were recorded. Their distribution is shown in Table II. The

TABLE II.
Distribution of Pulmonary Nodules.

	Right			Left		
	Upper	Middle	Lower	Upper	Middle	Lower
Male	16	38	57	22	41	27
Female	27	50	57	20	50	21
Total	43	88	114	42	91	48

preponderance of nodules in the right lower lobe is in keeping with the findings of other investigators and suggests that it is in this area of the lung parenchyma that inhaled particles most easily find lodgement.

Every individual showing parenchymal clouding, and those whose findings were recorded as suspicious were urged to have further radiographic studies. As the cost of the X-ray films had to be borne by the individual, a somewhat unsatisfactory response was obtained.

TABLE III.
Radiographic Studies

	Showing Clouding	Suspicious Findings	Total
MALE	14	49	63
X-rays taken	9	18	27
X-rays showing lesions	7	8	15
FEMALE	22	40	62
X-rays taken	17	20	37
X-rays showing lesions	14	2	16

Table III shows the results of this further examination. Of the 31 individuals showing lesions on the X-ray films, only three admitted, on close questioning, symptoms that might suggest "early tuberculosis." One had had symptoms at the age of 13, six years prior to our

examination, but had been perfectly well during the four years of schooling. Twenty-four of these 31 individuals admitted contact within the home with persons who had symptoms suggestive of pulmonary disease. Five denied any such contact, and two stated, that they had lived during the past few years with fellow-students who had coughed and raised sputum. In eight instances the disease was diagnosed as moderately advanced and active, and appropriate treatment was instituted. One of these patients is under treatment with artificial pneumothorax. The diagnosis in the case of a boy of 16 years, whose X-ray shows an unusual shadow at the right base, and whose blood is strongly positive to the Kline and Kahn tests, is still under consideration.

In twenty-two instances the lesion seen in the lung X-ray was diagnosed as "latent". The significance of these lesions and the necessity for treatment can not be known at this time. Patients showing such lesions have been kept at school under the special supervision of the school health nurse. They are made to rest during the school periods devoted to physical exercise and are advised to avoid everything of a fatiguing nature that is not a necessary part of the school curriculum. Special arrangements have been made in certain instances for country holidays under a "sanatorium" regime. These children are reexamined every three months and none have yet needed to be taken out of school. In one instance an apical lesion, moderate in extent, was seen to fibrose satisfactorily during a year of such handling.

This method of case-finding is easy to carry out; it is inexpensive and, contrary to findings of Hetherington and Flahiff,³ it was also found very reliable.

SUMMARY

Fluoroscopic examination of 1340 reactors to tuberculin in Peiping middle schools revealed demonstrable evidence of intrathoracic primary infection in 90 per cent. Changes suggesting reinfection tuberculosis were seen in about 10 per cent.

Radiographic studies were made in 64 instances on individuals selected on account of changes seen under the fluoroscope. Active tuberculosis in need of treatment was diagnosed in eight instances. Syphilis of the lung is suspected in one case. Twenty-two individuals are under special observation, though not removed from school, with a diagnosis of latent pulmonary tuberculosis.

EDITOR'S NOTE: China has a serious tuberculosis problem, as it is estimated that approximately a million of its citizens die of this disease annually. In this article Dr. Ch'iu manifests a most modern viewpoint of tuberculosis control. From the fine center of medical education in Peiping, Dr. Ch'iu is disseminating his most modern knowledge and his practical methods of controlling tuberculosis throughout the nation. As in every other nation, this will take time. Since Dr. Ch'iu uses the fluoroscope extensively, he will be greatly pleased to read in this issue that Dr. Stuehm has developed a fluoroscopic procedure by which he is now detecting pulmonary lesions that are not visualized on the ordinary X-ray film examination of the chest.

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Diagnosis of Tuberculosis by the General Practitioner*

Use of the Mantoux Test and the X-Ray

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IN the spring of 1934, a program of Mantoux testing with X-ray examination of positive reactors was started for all junior and senior high school pupils in South St. Paul where I am established as a general practitioner of medicine. The program was planned coöperatively by the doctors of the city and the school authorities with a representative of the Minnesota Public Health Association. This association supplied, out of Christmas Seal money, the funds and the personnel for the giving of the tests. The board of education assumed the cost of X-raying each positive reactor and arranged for pictures and final diagnoses with local doctors equipped for such work. The program thus established in 1934 has been repeated each year since that time and bids fair to become a regular institution in South St. Paul.

It is interesting to go back to the beginnings of this program. The first year there were eligible to receive the test 1061 boys and girls, 455 seventh and eighth graders, and 606 ninth, tenth, eleventh, and twelfth

*Presented before the Lymanhurst medical staff, Minneapolis, Dec. 12, 1938.

graders. The seventh and eighth graders ranged, in the main, from 12 to 14 years of age and the rest of the group, that is, the high school group, ranged from 14 to 18. I mention these age groups principally because of the interesting difference in the incidence of positive reaction to the Mantoux. Twenty-five per cent of the older group reacted positively while only 17 per cent of the younger group was positive. There is another interesting observation that should be made incidentally. That first year not everyone was ready to accept the service that was offered. The parents of only 80 per cent of the younger group allowed them to be tested while in the older group 89 per cent were tested. In later years—and I attribute this to a large extent to the good results that have been demonstrated and to the wholehearted coöperation of the school authorities—the percentages of pupils tested have been brought up to 92 and 94, respectively. As the percentages of pupils have come up and become constant, the incidence of positive reaction has also tended to become constant for each group, 14 to 15 per cent for the younger group

and 25 per cent for the older group. To me, it is a significant sidelight that every teacher, janitor, and other regular employee of our system must present a certificate of either a negative Mantoux or a negative X-ray to secure and hold employment.

By means of the X-ray in this program, we have located five young girls with active tuberculosis, all of whom needed sanatorium treatment. Four of them have been discharged from the sanatorium and the fifth is getting along nicely and will undoubtedly recover in the course of time. The discovery and treatment and cure of these five young people alone, to say nothing of the protection offered to others through their segregation, has already more than repaid the cost of the program thus far. But, after all, haven't we taken only the first step? I wonder. True, we had occasion, which except for this program we should not have had, to encourage young people and their parents to watch their health, to get plenty of rest, to observe regular hours, to eat plenty of good and wholesome food, to keep in touch with their family doctor. In short, we made them health and, probably, anti-tuberculosis conscious, but what becomes of the children who have been given only this one examination? Are they any better off to be told that they have had an infection and that there is now no evidence of active tuberculosis? What do they have to worry about! And yet we know how many of these positive Mantoux can and may become real active cases in five, ten, or twenty years. I was much impressed by a statement made by Dr. J. A. Myers of the University of Minnesota in one of his talks as to the percentage of active cases there will be in positive Mantoux in a given number of years. Obviously our job is to educate our reactors to a follow-up program. Positive reactors should be re-examined by X-ray, at least throughout the critical age when tuberculosis is most likely to exact its toll.

Prior to the re-examination, we have the problem of the first X-ray. How can we get even that? Not all communities have boards of education so alert and sensitive to the problem as do we in our community. Not all school systems have a superintendent of schools so concerned about this matter as ours. Probably part of the money raised to fight tuberculosis should be used to send positive reactors to be X-rayed in wholesale lot by some hospital clinic or X-ray laboratory. But suppose they have negative X-rays? We are back to our original problem.

Whatever the procedure that has been followed until our reactors have had their first X-ray, what about having the state or the state tuberculosis society supplied with the name of every positive Mantoux reactor so that this organization in turn may send periodic reminders to these people to be re-examined by X-ray and re-checked as often as expedient? There is a natural and practical limit to which the general practitioner can go in promoting a program of re-examination by X-ray. Regardless of his standing, there are always those who would suspect—if, indeed, not openly accuse—him of commercialization. He needs some neutral and authoritative source outside of the profession to push this thing. In our community we are fortunate to have a

superintendent of schools who, by authority of his board of education, contacts and re-contacts each year over a period of time the parents of each positive reactor, reminding them of the importance of having these youngsters take care of themselves, of keeping in touch with the family doctor, and of being re-examined by X-ray as suggested by the medical profession. This is done, in the words of Irvin T. Simley, superintendent of schools in South St. Paul, as part of the regular health service of the school. And, why not? Our modern school lists promotion of health as its first objective. In many communities it might be difficult to bring the school authorities to the point where they could and would put into effective operation this practice. Hence the question as to whether the state or the state's anti-tuberculosis society should assume the obligation.

Public health nurses can and should do much to advise and educate their constituents. They can keep in constant touch with positives; they see their families. They can explain the results of neglect and make all people tuberculosis conscious. However, they have many duties and a heavy program. Then, too, their intimate tie-up with the general practitioner and the medical profession as a whole might sometimes create an opportunity for the same kind of misinterpretation of motive as that to which the general practitioner himself is subjected.

In closing, may I direct a word to you lung specialists. I believe you should carefully guard your word in your work and your contact with the general practitioner. Not long ago I was at a meeting at which a lung specialist stressed that sometimes too early cases were sent to the sanatorium, that such cases should be kept at home. This discourages the general practitioner. He feels good to think he has made an early diagnosis, and then he finds he is criticized for being too cautious. I feel that the doctor cannot be too cautious any more than he can make the diagnosis too early. Indeed, is not early diagnosis the very thing that you lung specialists have always preached? I have had several experiences which show the importance of early diagnosis and precaution. In one family, a girl showed a positive Mantoux. I asked the rest of the family to come in and after readings I found that two of the children had to be sent to a sanatorium. I had another girl in her early teens who showed a negative Mantoux in 1933. The following year she was positive. I took an X-ray and found that she had an early case of tuberculosis but it was not bad enough to send her either to a sanatorium or to bed. I have watched her carefully and have re-examined her by X-ray every three months or so. Her lesion is calcifying satisfactorily. By continued excellent care, she may never become bedridden or a menace to others. The last two months I have had four cases who show very small findings. All have been re-checked and their lesions have been found to be stationary.

I have spoken of my personal cases because I want you to know that the general man is interested and that he is behind you. Once we general practitioners become interested, once we sense the problem, we take a great deal of pleasure and satisfaction in doing our little detective work. Get us interested enough, and the battle will be over.

The Instituto de Tisiologia of Cordoba

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TUBERCULOSIS is a serious problem in South America and all of the nations are beginning to work toward its solution. The Argentine Republic is taking drastic steps to control tuberculosis among its citizens. To the Province of Cordoba, because of its geographic and climatic conditions, large numbers of patients have migrated. Because of its hills, various altitudes are available and have been used extensively in attracting patients to this province. Indeed, Cordoba at present may be likened to the southwestern part of the United States from the standpoint of migration of tuberculous patients. Thus, a serious problem has been created from the standpoint of tuberculosis control.

For twenty years Dr. Gumersindo Sayago of the city of Cordoba and his co-workers have been effectively working to control tuberculosis. One result is the Instituto de Tisiologia, which is the most famous center for the study of tuberculosis in South America. In this Institute a great deal of work is done in four different departments, as follows:

1. Clinical and surgical studies of tuberculosis.
2. The prophylactic center.
3. Special research.
4. Vaccination.

The clinical work of the institute is conducted in the Transito Caceres de Allende Hospital, which has a capacity of 200 beds. During the year 1937, 391 patients were admitted to this institution and the monthly census was 260, which actually overtaxed the capacity of the hospital. This shows the need for more beds in this institution. It is of interest, however, to note that 75 per cent of the admissions to this hospital were non-residents of the Province of Cordoba; that is, patients from other provinces applied for admission to this institution because of its equipment, medical staff, climatic conditions, etc. (Fig. 1).

The institute is affiliated with the Medical School of the University of Cordoba and is located in close proximity to the school. Thus, a clinic service has been established where a great deal of work is done. For example, in 1937, 1883 sputum examinations, 3343 urinalyses, 732 various blood examinations, 137 chemical analyses, 48 examinations for parasites, 62 examinations of spinal fluid, 3085 X-ray pictures, and 144 major surgical procedures were done. Under the clinical department is a division of cardiology in charge of Dr. Agustin Caero; a gastro-intestinal division in charge of Dr. Calixto J. Nunes; an X-ray division directed by Drs. Carlos Quiroga and Gargiulo; a division of laryngology, directed by Professor Sosa; and a division of respiratory functions in charge of Dr. Antonio Sartori. The hospital also has twenty-five other clinical assistants and consultants. The staff alternates between the dispensary and the hospital services (Fig. II).

A postgraduate course for physicians is an important part of the activities of this institute (Fig. III-1). Also the students of medicine of the University of Cordoba are given a course during their senior year by Dr. Sayago, who is professor of Tisiologia of the medical school faculty. During the last few years, scholarships have been made available to other South American nations; for example, one to Paraguay, two to Chile, and one to Peru.

The prophylactic division is located in the recently organized dispensary, where approximately 700 new patients are admitted every year, in addition to the large number who have registered in previous years and continue to report to the clinic. This dispensary admits both adults and children and during the past three years its work has been increased by the examinations of students enrolled in the University of Cordoba. As a consequence of the importance that is given to the examination of students beginning this year, the university dispensary will operate under the supervision of the tuberculosis institute. This will involve examinations of 4000 students from the University of Cordoba.

The special research department carries on its activities in both the hospital and dispensary. Dr. Andres R. Arena (Fig. III-2), widely known in bacteriology, is chief of this department. There are also sub-divisions: one in chemistry, one in biology, and a third in pathology, in charge of Drs. Sartori, Sanguinetti, and Warcalde, respectively (Fig. III-3). A large amount of scientific work is conducted by this division, as indicated by the numerous publications in medical and scientific journals and the number of presentations before scientific societies of Argentina and other nations.

The vaccination department operates in the Maternity Institute, where Dr. Alberto Chattas, head of the children's section, administers BCG. The control of those vaccinated is carried out in the dispensary. BCG is prepared for oral, intradermic, and subcutaneous administration. More than 2000 children have been vaccinated. This work is conducted in a very scientific manner and involves a great responsibility in determining the appearance of sensitivity of the tissues to tuberculin, the general health conditions of those vaccinated, causes of death, and a careful comparison between those vaccinated and the unvaccinated control group. In this section, Professor G. Sayago has the immediate coöperation of Drs. Andres Arena, I. Maput, Alberto Chattas, Garcia Vera, A. Degry, and five visiting nurses (Fig. III-4). Every Saturday there is a staff meeting of the Institute where the most important subjects are discussed. These meetings are attended by the doctors mentioned before and also the chief of the hospital, Dr. Tomas Villafane Lastra, and chiefs of the different sections: Drs. Hector Becerra, Leonardo Dobric, Juan B. Rocca, Hector Soria, Isaac Wolaj, Hugo Contreras, Mario Gomez Casco, Carlos Arias Aranda, Elias Blinder, Raul Ortiz, Do-



Fig. I. Transito Caceres de Allande Hospital.



Fig. II. Dispensary, Instituto de Tisiologia.



Fig. III.

1. Physicians who took the postgraduate course in tuberculosis, July, 1938.
 2. Staff of the Laboratory: Dr. Daricarrer (Chile), Dr. Arena, director of the investigations, and Dr. Sanguinetti.

3. Part of the Pathological Anatomy Museum Staff with Chief Dr. Gonzalez Warcalde.

4. Pediatric Section: Left to right, Prof. Gumersindo Sayago, Director of the Institute, Dr. I. Naput, Dr. A. Chattas and Dr. Garcia Vera.

mingo Palazzo, Pedro Ibarra, Luis Luduena, Jose A. Perez, Julio Escarguel Malbran.

The Institute of Tisiologia collects the works and reports and publishes them in a review known as "Temas de Tisiologia." The objects of the Institute are to treat those ill from tuberculosis, to investigate every phase of this field so as to contribute knowledge to the subject, and to prevent the disease.

EDITOR'S NOTE: The Institute of Tisiologia of Argentina, here described by Dr. Chattas, is one of the most modern institu-

tions in the world. It has every facility known to be of value. Its medical staff is unsurpassed from the standpoint of training, scientific and practical knowledge, and actual application of this training and knowledge to the patient. Many of the staff members have spent long periods of time studying in Europe and the United States. It has been a great honor to the physicians engaged in tuberculosis work in the United States to have had several of the staff members of this institute visit them and study with them, as well as tuberculosis workers from other parts of Argentina and from other South American nations. The physicians engaged in tuberculosis work in Argentina have a clear vision of tuberculosis control. They recognize that the present annual mortality rate of 150 per 100,000 is a great loss to the nation. They are developing their program in a most modern way; indeed, they are constructing fifteen sanatoriums with a total capacity of 7500 beds. These, together with the fine institutions which they already have, will materially aid in solving their tuberculosis problem.

Primary Tuberculosis of the Skin*

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CUTANEOUS tuberculosis, though not observed frequently in America, is important for many reasons. The tuberculodermas, along with the various syphilides offer an unusual opportunity to study the complicated processes in allergy of infection, the variations in resistance in different individuals and the manifold possibilities of reaction both cutaneous and internal in the infected organism. Too long have dermatologists looked upon the tuberculodermas as isolated skin lesions probably because the original infection, in contrast to syphilis for example, is almost always internal and hidden. The natural history of tuberculosis and the reactive capabilities of the patient with cutaneous tuberculosis are often lost sight of in pondering over the tuberculous lesion rather than the disease in its entirety. In cutaneous as well as in other types of tuberculosis it should be realized that a constant struggle exists between the invading bacillus and the resisting forces of the host. This view enables us to better understand the various phases of activity and quiescence of a cutaneous tuberculous lesion, the lability of some tuberculodermas, the stability of others and the impossibility of arbitrary classifications with sharply drawn boundaries to all forms of tuberculosis of the skin.

PRIMARY CUTANEOUS TUBERCULOSIS

In this paper no attempt will be made to survey the entire subject of cutaneous tuberculosis. The discussion will be limited to the so-called primary complex as it occurs in the skin following infection by the tubercle bacillus in a person previously free from tuberculosis. It is a well-known fact that in both internal tuberculous infections in man and experimental external infections in animals the host reacts differently to the first implantation of tubercle bacilli than to subsequent ones.

The appearance and course of primary tuberculosis of the skin in guinea pigs has been known since Koch's work in 1891. Following cutaneous inoculation of the bacilli in a non-tuberculous animal, an infiltrate appears toward the end of the first week followed in another week by the development of a superficial, crust-covered ulcer. The regional lymph nodes become enlarged and palpable. The ulcer at the site of inoculation plus the adenitis has been termed the primary complex.

In guinea pigs which have been previously infected by the tubercle bacillus, an entirely different result is obtained following subsequent cutaneous inoculation. Within two days the site of implantation becomes dark and indurated and enlarges peripherally. Necrosis and sloughing soon occur, but in sharp contrast to the course of events in primary tuberculosis the area quickly and permanently heals and the regional nodes do not become involved. The reaction of the host is obviously pro-

foundly influenced by alterations in the immunologic response occasioned by the primary infection. "Tuberculosis immunity" is of course indefinite and not clear. It is nevertheless known that beginning with the first inoculation some biologic change occurs in the organism which alters the reactions against the tubercle bacillus from then on.

In man, due to the fact that most primary contacts with the tubercle bacillus occur in the lungs (Ghon tubercle) or at other internal points such as the gastrointestinal tract, the skin has been largely overlooked as a portal of primary infection. It is indeed true that in cutaneous tuberculosis, the patient almost without exception carries a latent or active tuberculous infection before the integument becomes affected.

According to Bruusgaard's¹ studies in Denmark the percentage of tuberculous individuals rises sharply with increasing age. Primary infection in the skin just as in the lungs or gastro-intestinal tract occurs most frequently between the ages of 2 to 6 years, occasionally up to puberty and only with extreme rarity in adults. The primary infection in the skin or accessible mucous membranes is comparable to that occurring internally, consisting of an ulcer at the site of inoculation accompanied by a constant adenopathy. The diagnosis, however, is not always easy to make on account of the variability in the appearance and localization of the lesion, in turn depending upon the number and virulence of the infecting bacilli and the inherent reactivity of the host against the specific virus.

So-called circumcisional tuberculosis represents one of the early recognized forms of external primary infection. In ritual circumcision among Jews and Mohammedans in which there is oral hemostasis there may be a direct implantation of large numbers of tubercle bacilli into an open wound should the operator have the organisms in the sputum. Fischl² reported 69 such cases and compared them with cases of primary infections of the ear occasioned by piercing the lobes for earrings. Holt³ and Wolff⁴ have also thoroughly reviewed the subject of circumcisional tuberculosis.

Duken^{5,6,7} has made many keen observations and contributions in the field of tuberculosis. He believed that the skin serves as a not infrequent point of metastasis for tuberculosis and cited several cases of primary cutaneous tuberculosis which he had observed on the face, upper lip, body, gums, mouth and throat. He further emphasized the importance of considering the primary tuberculous complex in the nose or throat in cases of cervical adenitis in children. In many instances the primary lesion may be small and hard to find. Its discovery and study, however, is an important aid in diagnosis and prognosis. Duken⁷ also cited Kleinschmidt, who described three cases in which the primary infection oc-

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curred in the middle ear in children, the diagnosis being made by finding the tubercle bacilli in the pus, the facial paralysis, and adenitis in the cervical and pre-auricular regions.

Bruusgaard's intensive studies of primary cutaneous infections laid the basis for the dermatologic knowledge of the subject. He first¹ reported seven cases in children varying in age from 15 months to 9 years, and later² further elucidated the subject and added three other cases. Bruusgaard emphasized the need of studying the skin as a portal of entry of tuberculosis and pointed out that the more one studies cutaneous tuberculosis in general the more one finds that the patients carry an active or latent tuberculous process elsewhere in the body.

In 1931 Krantz³ in an extensive and comprehensive study, brought the knowledge of the primary cutaneous complex up to date and reviewed the most important literature. He emphasized the fact that nearly all humans become infected by tubercle bacilli by the time of puberty but that such infections are not always evident clinically and may heal without recognition. Krantz shared the belief of Bruusgaard and others as to the rarity of the cutaneous primary complex. He stated that the most plausible explanation lay in the probability that some injury or at least special conditions must exist in order to give the bacilli an opportunity to grow. The frequent finding of the primary complex in the lung or intestine speaks against the concept that tubercle bacilli can pass through a mucous membrane without causing a reaction of the tissues. Krantz referred to several cases in which the primary lesion was located in the mouth, nose or throat. Dittrich,¹⁰ Ghon¹¹ and Rochat¹² have also made important contributions to the subject of primary cutaneous tuberculosis.

CASE REPORTS

Case 1. (Courtesy of Dr. H. E. Michelson). The patient was an American-born boy aged 18, well nourished and of average weight and size. In November, 1933, he felt slight discomfort in the right ankle which was attributed to ill-fitting shoes. In January, 1934, the ankle became swollen but a roentgenogram showed no abnormality and inoculation of animals with material aspirated from the joint gave negative results. In February pus formed and in March an incision was made in the region of the right ankle and cheesy material was expelled. The opening, rather than healing, became transformed into an irregularly round ulcer about 4 cm. in diameter. The inguinal nodes became enlarged. There was no history of tuberculosis or of contact with tuberculous persons.

Histologic examination showed tubercles embedded in the granulation tissue. Tubercles with caseation were found in one of the inguinal nodes. Inoculation of guinea pigs with material from the ulcer gave positive results with tubercle bacilli identified. Roentgenograms of the right ankle showed no bony involvement. Treatment was commenced with ultraviolet irradiation to the ulcer and roentgenotherapy to the inguinal nodes. The ankle was kept at rest in a cast; the patient was on a regime for tuberculous patients in the hospital. The swelling of the nodes receded, and the ulcer healed gradually with several foci in the vicinity lighting up and again disappearing. After nine months healing was complete. The patient's general condition was excellent and there was a marked gain in weight.

Case 2. (Courtesy of Dr. John Madden). J. A., a Mexican boy aged 9, was bumped on the right cheek in August, 1936.

The area became swollen, although there was no noticeable break in the skin. Within the next month a nodule appeared in the cheek which gradually enlarged. In September, 1936, the patient was kicked on the posterior surface of the left thigh and on the left side of the face followed soon by the development of ulcers in each location.

In October, 1936, the boy was first examined in the dermatology dispensary of Ancker Hospital, St. Paul. There was an undermined, deep ulcer 2 cm. in diameter over the right zygoma. The lesion was fixed to the underlying bone. Similar, though smaller, ulcers were seen over the left side of the mandible and the posterior surface of the left thigh. The submaxillary lymph nodes on the right were enlarged and matted together.

Roentgenograms of the maxilla, mandible, left femur and chest showed no abnormalities at this time. The Mantoux test (1:1000) was negative. Histologic sections from the ulcer on the right cheek showed tuberculoid structure.

By November, 1936, the nodes on the right side of the neck became fluctuant, broke down and draining sinuses appeared. The Mantoux test first became positive on December 15, 1936. Subsequent tests became more strongly positive until January, 1937, when a Mantoux test resulted in the development of a fever of 104° F. which gradually subsided within a week. In January, 1937, an inoculation of guinea pigs with material from the first lesion on the right cheek resulted in death of the animal and tubercle bacilli were recovered. The serologic tests for syphilis were negative on several occasions. Roentgenograms of the chest again in February, 1937, showed no evidences of pulmonary tuberculosis.

Following roentgenotherapy to the ulcers and nodes, complete healing occurred during the summer of 1937. The child gained weight and in August, 1937, appeared to be in excellent health.

CLINICAL FEATURES

The diagnosis of a primary cutaneous lesion is not always easy on account of its variability in appearance and location. In some cases, the ulcer is small, superficial and with no special characteristics, healing within a short time without appreciable scarring, while in others the lesion is more suggestive of tuberculosis, presenting an uneven granular surface, and a base made up of tiny tubercles. According to Duken⁷ healing has occurred within eight days, although the usual course is measured in months, as in other forms of tuberculosis. In some instances there is considerable induration so that the ulcer strongly resembles a syphilitic chancre, especially when it occurs on the genitals. The lesion may be undermined and covered with a crust penetrated by multiple perforations from which a yellowish-white mucopus emits. At times, especially as the ulcer begins to heal, papular infiltrations at the border may resemble small lupus nodules.

The regional adenitis is always an important diagnostic aid. The affected nodes usually appear within two or three weeks and at first are firm and discrete, although softening and sinus formation may subsequently occur. As in all forms of cutaneous tuberculosis, the wide variation in the reactivity of the tissues even to the primary inoculation of tubercle bacilli subjects the lesion to great differences in its clinical appearance.

The primary complex has been observed on various parts of the skin but with especial frequency on the extremities, chin, nose, cheeks, eyebrows, ano-genital region, fingers and toes.

The tuberculin reaction becomes positive within a few weeks after infection occurs. Wahlgren's studies (cited by Krantz⁹) indicated that the von Pirquet test became positive within six or seven weeks. According to most observers, tubercle bacilli were recovered from direct smears from the lesions or the regional nodes or were found in the microscopic sections of the biopsy material. Inoculation of animals, when done, frequently gave positive results.

The histologic findings are usually those of tuberculosis with the formation of tubercles with the usual cell attributes. Dittrich¹⁰ believed that there was no special structure typifying external infection. Montgomery¹³ stated that in the first few weeks of the infection the histologic picture was nonspecific, changing within three to six weeks to typical tuberculoid structure containing epithelioid and giant cells.

TREATMENT AND PROGNOSIS

Most observers agree that the successful treatment of all forms of tuberculosis depends upon placing the patient upon one of the well-known regimens that are accepted today, emphasizing rest and supportive measures. Krantz stated that the treatment of the primary cutaneous complex was no exception to the rule. Ultraviolet light and heat are of value. Roentgenotherapy to the regional nodes is of service.

Myers and Harrington,¹⁴ in investigating the subsequent health of children whose examination suggested primary infection, decided that the allergy produced sensitized the subject so that reinfection was of a much more serious nature. Michelson¹⁵ in a scholarly consideration of the primary cutaneous complex could find no evidence in the literature either for or against their contention but felt that cutaneous tuberculosis as a whole supported the hypothesis that sensitization of the organism favors the spread and continuation of the infection.

SUMMARY

1. The primary complex of tuberculosis of the skin consists of an ulcer at the point of inoculation of the

tubercle bacilli with an accompanying regional lymphadenitis.

2. The cutaneous primary complex represents the reaction which occurs when tubercle bacilli are implanted in the skin for the first time, and is comparable to the Ghon tubercle and affected regional nodes in the lung.

3. Such cutaneous infections are rare, and since most primary lesions occur internally (lungs or gastrointestinal tract), the skin as a portal of entry of the tubercle bacillus has been largely overlooked.

4. Two cases were reported and the clinical and histologic features, therapy and prognosis of the cutaneous primary complex were discussed. Case 2 was noteworthy on account of the three primary lesions appearing in each instance after trauma.

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A Review of the Pharmacology of Sulfanilamide*

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NO new drug of recent years has produced more widespread interest than that which followed the introduction of sulfanilamide for the treatment of certain infections. This present form of chemotherapy was initiated by Domogk¹⁵ in 1935. He reported that a brick-red dye "Prontosil" produced a favorable therapeutic effect in mice infected intraperitoneally with a virulent culture of the hemolytic streptococcus. A few months later another chemical substance, a bright red dye, was introduced for the same purpose. This substance was given the name "Prontosil Soluble or Prontosil S". This similarity in names has produced a sad confusion in terminology. At present Prontosil S is also known as Neoprontosil.

Shortly thereafter, Trefouel, Nitte, Nitte, and Bo-ver,⁶⁰ from a study of the chemical structures of the two prontosils, reasoned that they probably exerted their beneficial pharmacological action because of a possible common breakdown product. This substance, paraminobenzene-sulfonamide, was therefore tried experimentally and found to be highly effective. This white crystalline compound, to which the name "Sulfanilamide" was given by the Council on Pharmacy and Chemistry of the American Medical Association,¹¹ has repeatedly been shown to be the most efficacious; consequently, it is the preferred drug of the three. It is interesting to note that sulfanilamide was first synthesized by Gelmo²¹ in 1908.

The clinical use of sulfanilamide followed directly an accumulation of proof of its favorable pharmacological actions toward certain bacteria both in vitro and in vivo. In a consideration of an antiseptic or chemotherapeutic substance the first question that arises is whether the drug has any in vitro action. Colebrook and Kenny,⁶ Colebrook, Buttle and O'Meara,⁷ and Long and Bliss³³ were among the first to study this question. They found that the addition of sulfanilamide to a broth culture of the hemolytic streptococcus produced merely an inhibition in growth of the organisms over a period of several days. When the drug was added to rabbit, guinea pig or mouse blood, the effect again on the hemolytic streptococcus was merely an inhibition in growth, or a bacteriostatic action. In human blood the effect of the drug was more marked. It produced a killing of the organisms, or a bactericidal action in from one to two days. In this connection it should be remembered that human blood is bactericidal, whereas the blood from the other species mentioned is not bactericidal to the hemolytic streptococcus. It was also noted that whole blood without leucocytes showed a lessened bactericidal action upon the addition of sulfanilamide. Consequently it appears that the leucocytes enhance the action of the drug. In these experiments the optimum effect was produced with approximately a 1:10,000 (10 mgm. per cent)

concentration of sulfanilamide. In a similar manner, these same investigators have also studied the effect of prontosil soluble. In vitro it appears to be quite inactive. However, if the drug is first given to a human being the blood subsequently withdrawn now shows an increased bacteriostatic effect toward the hemolytic streptococcus. Less of this action is demonstrable in rabbits unless the rabbits are also given, intravenously, a reducing substance such as sodium formaldehyde sulfoxylate after the injection of prontosil soluble. These experiments offer further proof to the theory that the favorable action of prontosil S is largely due to its being reduced to sulfanilamide in the body.

Almost all investigators have observed that the bactericidal action with sulfanilamide in vitro comes on slowly. In other words, during the first few hours little or no decrease in the population of the streptococci can be observed. Later, over a period of 12 to 24 hours or more this effect becomes progressively pronounced. White and Parker⁶⁴ have made the same observation using a large number of strains of beta hemolytic streptococci. They found in addition, that at a temperature of 40° C., a bactericidal action was obtained against all strains with a concentration of 20 mgm. per cent of sulfanilamide. The bactericidal action disappeared in their experiments at temperatures below 39° C. It appears therefore that the temperature at which these in vitro experiments are conducted is extremely important.

Whitby³³ has commented on this lack of an instant bactericidal action. In his opinion this "lag" phenomenon may be an indication that sulfanilamide acts not as a poison to the bacteria, but rather as something that produces starvation or inanition of the organisms.

Recently Lockwood³² made a significant contribution to the problem of in vitro activity. He found that, if peptone or neopeptone was present in the human serum or whole blood culture of the hemolytic streptococcus, either one of these substances markedly interfered with the bacteriostatic action of sulfanilamide. This effect was demonstrated by comparing the growth of the organisms in the above media with and without peptone. The effect of sulfanilamide in the presence of peptone was a bacteriostatic action similar to that described by previous workers using broth culture media. No sterilization was obtained except in the media consisting of whole blood plus its leucocytes. In the absence of peptone, sulfanilamide produced a sterilization, or a bactericidal action in both serum and whole blood. These effects were obtained with a concentration of 1:10,000 sulfanilamide and in most instances required from 12 to 24 hours to be produced. Because peptone-containing broth, which is a favorite medium for growing the hemolytic streptococcus, was undoubtedly used by many previous investigators, it can be seen why a definite bactericidal action has not uniformly been obtained by them. Coincident with this bactericidal action, Lockwood also observed

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definite morphological changes in the streptococci. These changes, which are evidence of an injurious effect on the bacteria, begin at about eight hours and progress up to a complete sterilization at which time no further organisms can be observed. If streptococci are removed from this medium at any time before complete sterilization and disappearance, and transplanted to normal media they return to a normal rate of multiplication even more rapidly than unaffected controls. It is Lockwood's opinion that sulfanilamide in producing its characteristic effect interferes with the ability of the streptococcus to utilize protein, but that if peptone is present it can prevent or neutralize this action of sulfanilamide. This intriguing theory brings up the question of whether or not peptone-like substances may be present at certain times in the animal or human body which might interfere with the action of sulfanilamide. This might contribute to unfavorable curative results. Lockwood believes this to be the case. Lockwood's results might be considered as the first indirect proof that the drug in interfering with the metabolism of the bacteria leads to a "starvation" of the organisms.

King, Henschel and Green²⁷ have studied the effect of the drug on the hemolytic streptococcus with a tissue culture technique. They used media from the rabbit for growing the streptococcus. This animal, like the mouse and guinea pig, has much less resistance to this organism than has man. They have found that sulfanilamide, 1:10,000, reduces the culture growth by 80 per cent as compared to the controls. Even a concentration of 1:1,000,000 of sulfanilamide produces a significant reduction in culture growth. This again demonstrates a bacteriostatic action. In vitro experiments have also been conducted with many other organisms. Most of these, however, have not been studied as conclusively as the hemolytic streptococcus. Long, Bliss and Feinstone³⁵ reported that they were able to produce a bacteriostatic effect toward many organisms and in many instances even a bactericidal action, if the inoculums of the organisms were small and if concentrations of the drug of 1:10,000 and more were used. Among the organisms against which these actions have been obtained are, staphylococci, *Escherichia coli*, *Bacillus pyocyaneus*, *Bacillus proteus*, pneumococci, and the typhoid and paratyphoid organisms.

Other evidence as to the importance of the medium in which the bactericidal action of sulfanilamide is being studied can be obtained from the experiments of Helmholtz²⁵ conducted in urine. Here a marked effect has been obtained against *Staphylococcus aureus*, *Escherichia coli*, *Aerobacter aerogenes*, *Bacillus proteus*, and *Pseudomonas*. Increasing the alkalinity up to pH 7.5 resulted in a bactericidal action for all except the *Pseudomonas*. Furthermore, no bactericidal action was obtained against *Streptococcus faecalis*.

Another possible method of action that has been considered is the possible action of sulfanilamide in increasing phagocytosis. This was originally claimed by Long and Bliss,³³ and later denied³⁴ in further experiments in which the Welch bacillus was used. Numerous investigators beginning with Domogk have found evidence

for this action in the animal body. Lockwood's in vitro experiments indicate that phagocytosis can aid sulfanilamide in producing a sterilization of a virulent hemolytic streptococcus inoculation, especially in the presence of peptone. Alone, phagocytes from blood cannot produce this action. It is possible that in the presence of a hemolytic streptococcus infection sulfanilamide can produce a sufficient bactericidal action whereby the total population of the organisms is held down to a level where the leucocytes can effectively cope with the problem. Phagocytosis would thus be more of a secondary defense mechanism which could indirectly aid the body due to the primary injury produced on the streptococcus by sulfanilamide.

A third method of action described for sulfanilamide has been that of toxin neutralization. This was first claimed by Levaditi and Vaisman.³⁰ Their experiments purported to show that the drug neutralized the toxins that injure both red blood cells and white blood cells. Satisfactory confirmation of these results is lacking. Osgood⁵⁰ originally claimed this same method of action for sulfanilamide; but later Osgood and Powell⁵¹ reported that they were unable to obtain inhibition of the hemotoxins of beta hemolytic streptococci and of several other organisms with the drug. Meyer⁴⁸ obtained evidence of toxin neutralization with one of the prontosils. Gross, Cooper and Lewis,²³ studying both prontosils and sulfanilamide obtained evidence of toxin neutralization only with prontosil soluble. King, Henschel and Green²⁸ have also obtained definite evidence of an inhibition of hemolysis from the hemolytic streptococcus, not due to bacteriostasis, with prontosil soluble. In this respect there appears to be a difference in the action of sulfanilamide and prontosil soluble. The decrease in the action of streptococcus toxins due to sulfanilamide, as claimed by other workers, might be explained on the basis of bacteriostasis alone. For in the presence of decreased growth of the organisms there should be less toxin formed and liberated.

The attempts made to cure experimental infections with sulfanilamide and its derivatives have been conducted largely in mice, rats and rabbits. Since the time of Morgenroth and Levi⁴⁹ who studied the effects of ethyl hydrocuprein in experimental pneumococcus infections in the mouse, this animal has been a favorite for this type of work. Domogk's original communication on prontosil did not conclusively prove a prolonged survival against hemolytic streptococcus infections in mice. This lack of permanent survival or presumable cure was first pointed out by Levaditi and Vaisman,³¹ and has since been described by many workers. Many experimental bacterial infections in mice have been studied since that time. The most satisfactory survival rates in mice have been obtained in infections produced by the meningococcus and the hemolytic streptococcus. In these experiments therapy has usually been started a few hours after the intraperitoneal inoculation with the culture of the organism.

With the meningococcus, Buttle, Gray and Stephenson⁴ and Proom,⁵² have found that sulfanilamide protects mice from 1,000 to 1,000,000 minimal lethal doses

of this organism. The survival rates run from 50 to 100 per cent at one month. This is the greatest survival rate obtained in this animal with any organism. With a virulent hemolytic streptococcus,^{4,17} using from 1,000 to 10,000 minimal lethal doses the survival rates vary from about 50 to 94 per cent. This represents the second highest survival rate for a bacterial infection in this animal. If strains of the hemolytic streptococcus of low virulence are used the survival rates in mice are much lower. Recently, Loewenthal³⁷ has reported an increased percentage of survival in mice treated both with sulfanilamide and an antistreptococcus serum.

Feinstone, Bliss, Ott, and Long¹⁷ have carried out some experiments using comparable doses of sulfanilamide and prontosil soluble. In two groups of mice inoculated with 100–1000 M.L.D. of hemolytic streptococci, one group was treated with 6 mgm. doses of sulfanilamide, and the other with the same number of 6 mgm. doses of prontosil soluble. In the first group a 29 per cent survival rate was obtained and in the second, 14 per cent survived. From a theoretical standpoint 6 mgm. of sulfanilamide can be formed by reduction from 20.5 mgm. of prontosil soluble. Therefore in a third series of mice this dose of prontosil soluble was administered as above. This produced a survival rate of 33 per cent. It can be seen therefore that in mouse hemolytic streptococcus infections the action of prontosil soluble appears to be related to its possible sulfanilamide content.

The results obtained with sulfanilamide in experimental pneumococcus infections are much less promising. Using highly virulent strains of this organism, 10 to 100 M.L.D., Rosenthal⁵⁵ obtained survival rates as follows: type I, from 8 to 17 per cent, type II, 8 to 17 per cent, and type III, 8 to 42 per cent. In addition, Branham and Rosenthal³ found, with type I pneumococci, that a therapy consisting of sulfanilamide plus specific antiserum, produced a survival rate of 40 to 45 per cent. This therefore shows a beneficial synergistic effect. Cooper, Gross and Mellon¹⁰ have given 10 M.L.D. of type III pneumococci to mice subcutaneously and have obtained survival rates up to 70 per cent at 25 days. Cooper and Gross⁷ have also studied the effect of sulfanilamide in rats given type III pneumococcus infections by intrabronchial injection. Depending on the size of the inoculating dose and the time of therapy (instituted early or late) the treated animals showed survivals considerably higher than in the control group. In one experiment, 0.1 cc. of a 1:1000 dilution of an 18 hour culture was the inoculating dose. In the control series 0 per cent survived, whereas in the group where therapy was instituted six hours after inoculation the survivals amounted to 60 per cent. These investigators are of the opinion that sulfanilamide is worthy of trial in clinical type III pneumococcus infections.

Sulfanilamide has also been used in a number of other experimental infections, chiefly in mice. Cooper, Gross and Lewis⁸ have obtained a high degree of survival in mice in short experiments against 100 lethal doses of *Escherichia coli* and 10 lethal doses of *Bacillus proteus*. They obtained no protection against 10 L.D. of *B. pyocyaneus*. Long and Bliss³⁴ have reported a curative effect

of sulfanilamide in Welch bacillus infections in mice. Welch, Wentworth and Mickle⁶¹ have reported a curative effect of the drug in *Brucella abortus* infections in guinea pigs. A number of studies have been made on the effect of sulfanilamide upon *Staphylococcus aureus* infections in mice. Mellon, Shinn and McBroom⁴⁷ obtained a survival rate in mice of 38 per cent which is only slightly better than the 14 per cent survival rate in the controls at 28 days. Bliss and Long² obtained a survival rate in sulfanilamide-treated mice of only 8 per cent, compared to 0 per cent survival in their controls. The drug has been used in experimental tuberculosis infections in guinea pigs by a number of investigators. Rich and Follis⁵⁴ found that over a period of five to six weeks sulfanilamide-treated animals showed less extensive pathological lesions than the controls. The treated animals showed less macroscopic and microscopic evidence of the disease than did the controls. In the treated animals the spleens and tracheobronchial lymph nodes showed no appreciable enlargement. The direct opposite occurred in the controls. The treated animals furthermore showed fewer tuberculosis bacilli in the lesions than did the controls. Smithburn⁵⁷ obtained no beneficial effect from the drug when the tubercle bacilli were given intracerebrally. Greey, Campbell and Culley²² found that if the administration of the drug was begun before the infection it inhibited the development of tuberculosis. If on the other hand, the infection had been present 17 or more days, the drug appeared to have no effect. Kolmer, Raiziss and Rule²⁹ have also observed that sulfanilamide therapy begun two hours after inoculation is without any beneficial effect.

Gay and Clark¹⁸ have studied the effect of sulfanilamide in experimental hemolytic streptococcus empyema in rabbits. They have a standard technique whereby the intrapleural injection of 1000–2000 M.L.D. of their organisms produces a uniformly fatal empyema at from four to six days. In infected rabbits treated with 1.2 Gms. per day of sulfanilamide in divided doses over a period of two days, striking results have been obtained. Whereas in the controls, the blood cultures became positive for the organisms at 12 hours, and the blood leucocytes showed degenerative changes at 24 and 48 hours, the treated animals showed only sterile cultures, with no leucocytic degeneration. Furthermore in the treated animals there occurred an increase in the polymorphonuclear and mononuclear leucocytes at about 40 hours which persisted. In the pleural cavities the control animals showed a marked increase in the number of organisms, up to 20,000 times as many as were injected, plus fluid containing degenerated leucocytes at about 48 hours. On the other hand, the treated animals showed only a slight increase in the number of organisms, up to 10 times as many as were injected, during the first few hours. At 24 hours many of the treated animals showed sterile pleural cavities and at 48 hours even more were sterile and they continued in this manner. In the treated animals, furthermore, no fluid collected in the pleura and the leucocytes and locally derived clasmatoocytes which appeared showed little evidence of degeneration.

The acute toxicity of sulfanilamide has been deter-

mined in a number of species of animals. The greatest amount of work has been conducted in mice where the 50 per cent lethal dose has been found and reported to vary from 3.3 Grams¹⁷ to 6.3 Grams¹ per Kg. of body weight. It would appear that the drug, given in acute experiments is not highly toxic. In the rabbit the 50 per cent lethal dose has been found by Raiziss, Severac and Moetsch³³ to be 2 Grams per Kg. of body weight. Marshall, Cutting and Everson¹⁴ have found that this same dose per Kg. may be lethal in dogs. They have found further that doses of 1 Gram per Kg. of body weight in dogs, produce salivation, hyperpnea, nausea, vomiting, diarrhea, excitement, ataxia and spastic gait. These symptoms last about 12 hours. Acidosis is also produced in dogs. Smaller doses administered daily to dogs and growing rats produce no evidence of toxicity or pathology. Rosenthal³⁶ has reported peripheral neuritis in chickens. Hawking²⁴ observed symptoms resembling decerebrate rigidity in rabbits and cats following doses of 1 and 2 Grams per Kg. Animals that survived a week were sacrificed. Chromatolysis was observed in the neurones of the anterior column of the spinal cord and in some of the nerve cells of the cortex and mid-brain. Custer, Forster, Lamotte, Patton and Phinney¹³ have also studied the toxic reactions of sulfanilamide, 0.67 Gm. and up per Kg. per day, in dogs. They have observed similar evidence of central nervous system irritability progressing to spasticity and rigidity, the duration of which was not over 12 hours. Pathologically the brains and spinal cords of dogs showed edema and degenerative changes. In their opinion the symptoms were produced by the edema. In other words, the primary effects of the drug were the production of edema and anoxemia. This is suggested by the rapid return of the dogs to normal. Barlow¹ has also studied the 50 per cent lethal dose of prontosil soluble in mice. By subcutaneous injection it is 6 Grams per Kg. of body weight, and by mouth, 40+ Grams. This would indicate that when given orally, absorption is not complete. A very low absorption of orally administered prontosil soluble in dogs has also been observed by Marshall, Cutting and Cover.⁴⁵

The clinical use of sulfanilamide has resulted in a rather wide variety of toxic manifestations.³⁵ Fortunately most of the symptoms reported appear to be neither severe nor dangerous to life. A few definitely dangerous reactions have been reported. For the most part the alarming reactions have not as yet been observed in animals. Within a short time after the administration of single large doses of sulfanilamide or prontosil soluble to man, symptoms such as nausea, vomiting, dizziness, headache, mental excitement and confusion may occur. These symptoms, probably of cerebral origin, usually disappear within a day. Their chief danger lies in ambulatory patients, where these symptoms may contribute to accidents. Acidosis and cyanosis occur quite commonly. The former may be controlled with sodium bicarbonate. Neither are considered sufficiently dangerous to warrant withdrawal of the drug. Marshall and Walz⁴³ suspect the cyanosis to be due largely to a colored oxidation product of the drug. Methemoglobin

formation may also be a factor in the cyanosis. Jaundice, which indicates liver injury, has been reported. This may become a dangerous symptom, but to date it has not received sufficient study.

A number of symptoms which appear to indicate hypersensitivity to the drug have been described as occurring after several days of therapy. These are, lacrimation, sneezing, fever (not due to the infection), photosensitivity and skin eruptions, acute hemolytic anemia, sulfhemoglobinemia and agranulocytosis. For the most part, when these occur it is believed that the administration of the drug should be discontinued. Repeated transfusions are strongly indicated for the anemia. In the milder grades of anemia that develop slowly, with sufficient transfusions when indicated, it may not be necessary to discontinue the drug. In the severe type of reaction the red cell count and hemoglobin content drop rapidly over a period of several days, even to 50 per cent or below normal. In the presence of this marked reaction the drug should be discontinued. This toxic reaction has given rise to the opinion that either red cell counts or hemoglobin determinations should be done daily on all patients undergoing sulfanilamide therapy.

Sulfanilamide is readily absorbed by the animal or human body following oral or subcutaneous injection. When given by the oral route the absorption is almost always so satisfactory that it is seldom necessary to employ any other method of administration. In the presence of nausea and vomiting injection therapy is indicated. Following a single oral dose of several grams the blood level usually reaches a maximum within one to two hours and is fairly well maintained for from three to five hours additional. Elimination, via the urine, is complete in about 24 hours.⁴⁰ In the presence of renal insufficiency excretion is considerably retarded. From the work of Marshall, Emerson and Cutting¹² in dogs it is known that the drug is quite uniformly distributed through the soft tissues. Its concentration in the spinal fluid is from 60 to 80 per cent of blood concentration. In the dog the drug is excreted unchanged, in the rabbit mostly as an acetylated derivative. In man it is excreted partly unchanged and partly acetylated. This derivative is much less therapeutically active than the original sulfanilamide.⁴⁰ In mice it is also more toxic. The speed of acetylation appears to be quite rapid; consequently this is a factor that may, at times, interfere with the beneficial effects of the drug. This is an important consideration and requires much further study. Stewart, Rourke, and Allen³⁸ have studied the elimination of the drug in man and have found that the acetylated derivative shows a higher renal clearance than sulfanilamide. This is fortunate. The total urinary elimination of the drug is almost 100 per cent. Diuresis increases its excretion. For the determination of the sulfanilamide content of biological fluids the method of Marshall^{38,39,40} is most commonly used.

Sulfanilamide therapy is indicated in a number of specific clinical conditions. Wherever possible the diagnoses should be proven by bacteriological tests. Meningococcus infections are an important indication. In limited numbers of clinical cases the results obtained have been

very satisfactory. Because it has been shown experimentally that specific antiserum plus the drug produces the most satisfactory results, this technique is perhaps the best. The most common indications for the use of this drug, however, are the infections produced by the beta hemolytic streptococcus. Experimentally the most striking results have been obtained in early infections produced by highly virulent organisms. Some beneficial results, however, have been obtained with hemolytic streptococci of low virulence. No satisfactory therapeutic results have been noted with the *Streptococcus viridens*. Another coccus against which sulfanilamide appears to have a decided clinical action is the gonococcus. Little experimental work in animals with this organism has been reported. Since the report of Dees and Colston¹⁴ on this subject, the literature has increased to show that it is a worthwhile contribution to this field. Due to the low beneficial effect of sulfanilamide in experimental pneumococcus infections it is not surprising to find few or no clinical studies on these diseases. Cooper and Gross,⁷ however, believe it should be given a careful and extensive trial in type III pneumococcus infections.

The drug also appears to be indicated and has been reported to have a favorable effect in infections due to the Welch bacillus, *Brucella abortus*, and urinary tract infections due to a number of organisms. In this last group of clinical cases one might expect quite satisfactory results because the concentration of the drug is increased by passage through the kidneys and thus urinary concentrations are attained that would never be possible in other parts of the body.

Sulfanilamide is most conveniently and most satisfactorily given to man orally in tablet form. As a rule absorption is rapid and complete. In the presence of such symptoms as nausea and vomiting where oral administration is questionable or impossible the drug may be given by subcutaneous injection. The low solubility of the drug in water however (0.8 per cent) makes it necessary to administer rather large volumes of water. At the onset of sulfanilamide therapy where a rapid rise in the blood concentration is desired, a procedure studied by Marshall, Cutting and Cover¹⁵ in dogs might be used. Giving doses of 0.1 Gms. per Kg. of body weight, in gelatine capsules orally, they found that the maximum blood level (10 mgm. per cent or over) was reached at about two hours and maintained for several hours longer. If on the other hand, a water solution of the drug was administered orally, the maximum blood level, identical with the above figures, was attained in 30 minutes and maintained for from three to four hours. In this study they found that absorption from the stomach was slight, but from the small intestine, rapid and marked. There is no reason why a water solution of the drug might not be used clinically, by mouth, to institute therapy as quickly as possible. No safe solvent, save water, is known at present. In this connection the marked poisonings that occurred a few years ago when sulfanilamide was administered in solution in diethylene glycol ("Elixir of Sulfanilamide") should not be forgotten^{19,20}. Pron-

tosil soluble may be administered orally or by subcutaneous or intravenous injection.

When sulfanilamide is given to a patient the aim of the therapy for the first few days is to give enough to produce a concentration in the body of approximately 1:10,000 (10 mgm. per cent in the blood). The reason for this is that the earlier workers in this field found that the optimum bacteriostatic concentration *in vitro* was about 1:10,000. The most recent pronouncement of Long, Bliss and Feinstone³⁵ is that for the control of severe infections, a blood level of 10 to 15 mgm. per cent is indicated, and for the control of mild and moderately severe infections, a blood level of 5 to 10 mgm. per cent will probably suffice. In patients who are severely ill they begin with an initial dose of about 60 mgm. per Kg. or $\frac{1}{2}$ grain per pound of body weight and then continue with about 15 to 20 mgm. per Kg., or .1 to .12 grains per pound of body weight at four-hour intervals day and night. With suitable blood determinations of the sulfanilamide level this dosage is maintained until clinical improvement occurs. Then the total daily dosage of the drug is lowered day by day and it is discontinued when the patient is about ready to get up. In milder infections, a high initial dose may not always be necessary. In these cases the patients are put on doses, every four hours, of 15 to 20 mgm. per Kg. or .1 to .12 grains per pound of body weight. It should be remembered that these "four hour" doses are given both day and night and that sodium bicarbonate is given with each dose of sulfanilamide in amounts equivalent to from 50 to 100 per cent of the Grams or grains of sulfanilamide. In children it has been found that somewhat larger doses per Kg. or pound of body weight are necessary to maintain similar blood levels of sulfanilamide. It is interesting to note that in the few years of sulfanilamide experimentation and clinical therapy the time interval between the doses given the patient has been shortened from six or eight hours, to four hours. This has been done in an attempt to give the body of the patient more frequent supplies of the fresh drug to take the place of the inactivated acetylated derivative. No one as yet knows whether the four hour interval is best or whether the future will show that two or three hour intervals are still better. This should await further chemical analyses on the blood of patients to show the speed of acetylation. The absolute duration of therapy is another question of great importance. Formerly it was thought that the drug should be given for from five to seven, and occasionally ten days. Long and his associates now prefer to give the drug until the patient is almost well. In other words, the duration of therapy must be determined for each patient. It appears then that therapy of ten or more days may frequently be necessary. It should also be remembered that the sulfanilamide concentration in the body can be maintained more readily on a low water intake. Conversely, in the presence of diuresis the drug is washed out through the kidneys more rapidly, and suitable and uniform blood concentrations are more difficult to maintain.

SULFAPYRIDINE

Since Trefouel and his associates first described the

chemotherapeutic action of sulfanilamide in experimental hemolytic streptococcus infections, hundreds of derivatives of this substance have been synthesized and studied experimentally. A few of these have been tried out clinically. Perhaps the most outstanding of this group is 2 — (p-amino benzene sulphonamido) pyridine, also known as May and Baker 693, which was first used in the chemotherapy of pneumococcus and other experimental infections by Whitby.⁶² Sulfapyridine is the non-proprietary name given to this drug by the Council on Pharmacy and Chemistry of the American Medical Association.¹² Whitby found a high degree of survival in mice against 10,000 M.L.D. of pneumococci, especially of types I, V, VII and VIII. He also found it to be quite active against the hemolytic streptococcus. Wien⁶⁵ found the 50 per cent lethal dose for mice to be 16.6 Grams per Kg. of body weight given by mouth. On the other hand, Marshall, Bratton and Litchfield,⁴⁶ found the 50 per cent lethal dose for mice to be only 2 Grams per Kg. of body weight, for the soluble sodium salt. Therefore it must be assumed at present that most of the orally administered sulfapyridine, in mice, is not absorbed. After absorption it appears to be somewhat more toxic than sulfanilamide. They have found, moreover, that absorption and excretion of the drug is more erratic than for sulfanilamide. Like the latter, it is excreted unchanged by the dog, but also as an acetylated derivative by the rabbit, man and mouse. The acetylated sulfapyridine also appears to be just as toxic as the unconjugated compound. The relative toxicity and safety of sulfapyridine as compared to sulfanilamide is yet to be determined in other species of animals and man. Stockinger⁵⁹ has recently reported some studies on sulfapyridine. He has also found that this drug is acetylated by the rabbit and man, but not by the dog. He also has determined the amounts of the free drug and the acetylated form in the blood of rabbits following oral doses of 1 and 2 Grams. It is interesting to note that at from two to six hours after administration the level of the acetylated derivative rises above that of the free sulfapyridine. This acetylated derivative appears to be therapeutically inactive just as is the case with acetylsulfanilamide and the hemolytic streptococcus. In patients whose blood was analyzed at varying time intervals after administration of the drug he found that the acetylated derivative accounted for about half of that present in the blood. This appears to indicate that a greater percentage of sulfapyridine is acetylated, in man, than is the case with sulfanilamide. The speed with which acetylation occurs serves to emphasize the importance of administering this drug also in divided doses at intervals no greater than every six hours in order to maintain as much free sulfapyridine in the blood stream as possible and to keep adding new supplies frequently.

Sulfapyridine has been studied in type II pneumococcus infections in mice and rats by Cooper, Gross and Lewis⁹. Using 10 to 100 lethal doses in mice at 21 days their survivals were: controls, 0 per cent, sulfanilamide, 25 per cent and sulfapyridine, 45 per cent. In rats using less than 100 lethal doses injected intracranially their survivals at 21 days were: controls 0 per cent, sulfanilamide

50 per cent, and sulfapyridine, 57 per cent. Hilles and Schmidt²⁰ have also reported that sulfapyridine has a beneficial action on pneumococcus infections in mice. This effect was marked in 19 of the 30 types studied, and mild (did not lead to recovery of the mice) in the remaining 11. Bliss and Long² have studied the drug in *Staphylococcus aureus* infections in mice. Where sulfanilamide produced a survival of only 8 per cent of the mice at 14 days, sulfapyridine resulted in a 32.6 per cent survival. It appears therefore that the drug has a more promising therapeutic effect on the various types of the pneumococcus and the *Staphylococcus aureus* than sulfanilamide. Long has also reported that the drug is effective in experimental infections due to the Friedlander bacillus and the Welch bacillus in mice.

The toxic symptoms observed to date in man appear to be much like those produced by sulfanilamide. Those reported are nausea, vomiting, dizziness, headache, fever, morbilliform rashes, tingling in the extremities, acute hemolytic anemia and agranulocytosis.

In all probability sulfapyridine will be released for general use by the profession. As was reported in the *Journal of the American Medical Association*¹⁶ there is still much to be learned about this drug before it can safely be used. It appears that the drug's toxicity is much like that of sulfanilamide, and as was pointed out, the addition of the pyridine molecule may increase the toxicity. The Council on Pharmacy and Chemistry of the American Medical Association³⁶ have also voiced caution in the use of the drug because of inherent toxicities, irregular absorption, lack of knowledge of its exact indications, and lack of rational schemes of therapy.

SUMMARY

No more interesting chapter on the therapy of bacterial infections has ever been presented, than is being written daily on the actions and uses of sulfanilamide and its derivatives. They are being studied and used in infections produced by the meningococcus, the beta hemolytic streptococcus, the pneumococci, the gonococcus and certain other bacteria.

NOTE: Since the above manuscript was submitted, the Council on Pharmacy and Chemistry of the American Medical Association, (*Journal American Medical Association* 112:733, 1939) has included further data on Sulfanilamide in New and Nonofficial Remedies. In addition to brief descriptions of the Actions and Uses, and Toxicity which agree with the data herein assembled, the Council suggests the following Dosage. In adults, in cases of serious infections, the dose is about 1 Gram (15 grains) given every four hours for 48 hours, and then from 0.4 Grams (7½ grains) to 0.66 Grams (10 grains) every four hours thereafter. It is believed advisable to continue the therapy for a few days after clinical recovery in order to avoid relapse. In cases of gonorrhea, the drug should be given for a minimum of two weeks. In mild infections, where no threat to life exists, an adult dosage of from 3 to 4 Grams per 24 hours (given in divided doses, i. e. every four hours) is their recommendation. The Council notes further that infants will tolerate from one-third to one-half, and children, one-half to three-fourths of the adult dosage. For patients who cannot take sulfanilamide by mouth, equivalent doses may be given by subcutaneous injections of a freshly prepared 0.8 per cent solution. Injections should be given at six to eight hour intervals. The solution is made by dissolving 8 Grams of pure sulfanilamide crystals in one liter of warm physiologic solution of sodium chloride, or 1 per cent sodium chloride solution, or 1/6 molar sodium lactate solution.

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Surgical Collapse in the Treatment of Pulmonary Tuberculosis

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THORACOPLASTY

As early as 1885 DeCerenville suggested an operation to partially collapse the tuberculous lung by removing short sections of the ribs overlying the pulmonary cavity. He resected short segments of the ribs only. Cavity drainage was also suggested by him and since that time has sporadically been in vogue. Only recently Coryllos has described a technique for cavity drainage

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with muscle transplant to close the open bronchus leading from the cavity. About the same time that DeCerenville described his thoracoplasty, Carlo Forlanini, an Italian, revived the studies of Carson which were written in 1819 giving the principle and theory of artificial pneumothorax. Within a few years, Forlanini reported his successful clinical results with this procedure. They were successful because of Lister's work in antiseptics. Following this, artificial pneumothorax was used in very selected cases, but not until the past several years has it reached popular favor. At the present time it is one of, if not the most important method of collapse therapy. Certainly, it is the most widely used. Because artificial pneumothorax is considered in most clinics as a medical procedure, it will not be discussed in this article.



Fig. 1A. Marked unilateral involvement, with a large subclavicular cavity. Chronicity shown by displacement of mediastinum to left.

Following DeCerenville's original thoracoplasty, the procedure was used only sparingly until the early part of the 20th century when Friedrich again revived it. Brauer modified Friedrich's procedure and the operation was known as the "Brauer-Friedrick." This consisted of the removal of almost all of the ribs on one side of the chest. It was dangerous, but efficient. Soon after, Wilms and Sauerbruck of Germany removed short sections of eleven ribs. This was safer, but not so successful and many cavities were left open. Brauer aimed to reduce his high mortality, and introduced his "subscapular paravertebral thoracoplasty" which was a compromise between the Sauerbruck removal of short sections and the original Brauer operation where long sections were removed. The first operation of this type performed by Brauer was done in 1911. Later, Brauer, at Becker's suggestion, added an anterior incision to supplement the posterior incision so that he might remove at one operation greater lengths of the important upper ribs than he could reach from behind.

Brauer was more successful than the other group in closing cavities, but still had a high death rate. He usually performed his operations in one stage, as he felt that a good collapse could not be obtained in stages. Also, incomplete removal of the anterior sections of the upper ribs, especially the first, failed to collapse a fair number of cavities.

In 1928 Alexander began to use the modern posterolateral thoracoplasty in which all of the first rib and sections of the second and third to their costal cartilages are removed from a posterior approach. Also, only the number of ribs necessary for a good collapse are removed; an endeavor being made to conserve as much



Fig. 1B. Seven rib thoracoplasty performed in two stages, last stage on September 20, 1938. Note collapse of cavity and that only the ribs overlying the cavity have been removed. Sputum negative since completion of second stage. Patient discharged from sanitarium on February 21, 1939.

good lung tissue as possible. As most tuberculous cavities are in the upper lung fields, very often a considerable portion of uninvolved lung tissue is saved in the base.

At our sanitarium it is customary to remove the entire upper three ribs at the first operation, unless the condition of the patient prohibits this. This is followed in from two to five weeks by a second stage. At this operation more ribs are removed, the number varying according to the amount of collapse necessary for good results and to the patient's ability to withstand the surgery. The modern thoracoplasty has given results at this institution that are comparable with those over the country, in which from 70 to 85 per cent of cavities are collapsed with continuous negative sputum. The mortality rate has been so lowered that it is now an unusual occurrence for a death to result following a thoracoplasty. Mortality rate is a variable in different clinics and its variation is not due to surgical technique nearly as much as to what type of patients are selected for operation. If only the so-called "good chronics" are chosen and those in which the disease is confined to one side, then a mortality rate of not over 5 per cent is to be expected. On the other hand, there are many patients who are doomed, without surgery, and it is always surprising to see how many of these can be saved by carefully spaced multiple operations. Certainly, in such a situation the surgeon should not be interested in mortality rates but should try to save as many of these doomed people as possible.

If the surgery is carried out in a sanitarium, then care must be exercised so that the mortality rate is not so



Until the past few years bilateral collapse therapy was practically unknown and when bilateral cavitation was present almost no patients recovered.

Fig. 2A. Demonstrates a large cavity on the left which failed to collapse following pneumothorax because of the wide, lateral adhesion. The right lung shows an infiltration, with a large cavity.



Fig. 2B. The wide adhesion was severed in two stages, the base of the adhesion being dissected from the chest wall by the cold cauterization technique.

high that many who would be good risks are reluctant to submit to operation. In this institution, by selecting one or two good risks and then one that might be lost, we have been able to preserve a desire for surgery among the patients. Instead of suggesting thoracoplasty to patients, more often it is the patient who requests it.

Anesthesia. It is probably due to the advances made in anesthesia that thoracic surgery has shown such progress in the last few years. The anesthetic of choice in most clinics is cyclopropane, which is so well adapted to thoracic surgery because of the high proportion of oxygen that is used with it. Since Matson discouraged the use of local anesthesia because he felt there was danger of the novocaine following the nerve sheaths into the spinal canal and reaching toxic levels, local infiltration and nerve block has been used by only a few surgeons in this country.

In our surgery, local anesthesia has been the anesthesia of choice, first preceded by avertin rectally. The advantage of an anesthetic of this type is that the valuable cough reflex can be preserved, thus eliminating many spreads through spill-overs to the opposite side during the operation. When cyclopropane is used with the intratracheal catheter so that suction removes the excessive accumulations, this danger is largely eliminated. When a patient is having considerable pain following the use of local infiltration, or is apprehensive, we do not hesitate to use a general anesthetic in the form of cyclopropane. In our opinion, thoracic surgery cannot be carried on successfully without the use of cyclopropane.

Technique. The patient is placed in the lateral posi-

tion, with the side to be operated upon uppermost, and the head of the table lowered to an angle of about 20 degrees. An incision is made, beginning about three or four finger-breadths below the upper edge of the trapezius. The incision is then extended in a curved manner about midway between the thoracic vertebral spines and the vertebral border of the scapula to a point two finger-breadths below its angle, and carried anteriorly to the anterior axillary line. The incision is then carried down through the trapezius and rhomboid muscles, and laterally through the latissimus dorsi and several centimeters through the anterior serratus.

The upper digitations of the serratus magnus are then separated from their rib attachments, until the perforating branches of the intercostal nerves are exposed. This gives an excellent exposure so that the upper ribs can be resected. The upper three ribs are resected subperiosteally from and including the transverse processes of the vertebrae posteriorly to the costo-chondral junctions, anteriorly. The cartilage of the first rib is often resected with the rib.

SEMB APICOLYSIS

In 1934, Carl Semb of Norway advocated the freeing of the pleural dome by separating it extrafascially and allowing the dome to drop to the level of the fourth rib. He also recommended the removal of the periosteum and the intercostal bundles. The result of combining lung mobilization with upper thoracoplasty has enabled thoracic surgeons to collapse giant cavities which previously were most difficult to collapse. It is also possible to lengthen the interval between stages without jeopardizing an effective collapse. At this institution, in all large



Fig. 2C. The left pneumothorax being maintained, a right pneumothorax failed to collapse the cavity on this side because of another large adhesion.



Fig. 2D. The large right adhesion was severed and the lung kept under bilateral pneumothorax. At this stage the patient suffered little from dyspnea and was able to take short walks in the open.

cavities the Semb modification has been carried out for the past four years, and the results obtained have justified the use of this procedure.

In carrying out the dissection of the pleural dome, it is necessary to dissect in the extrafascial plane and to sever bands of fibrous tissue which are constant. These structures received the name of "Sebilean's Bands" and are composed of a costopleural ligament, a vertebral pleural ligament, and the scalenus minimus muscle. The scalenus minimus is present in approximately one-half of individuals. In separating these bands, it is necessary to sever them by sharp dissection, and care must be taken not to injure the brachial plexus or subclavian vein. When this procedure is carried out, it is not necessary to resect the first dorsal transverse process because the lung is dissected far below this area.

Overholt fills the remaining large space with saline solution which acts as a tampon in aiding the collapse. At this institution, the saline solution is not used because it is found that this space very rapidly fills with sero-sanguineous fluid.

SECOND-STAGE THORACOPLASTY

The second-stage operation is usually carried out after three weeks have elapsed. The incision is through the scar of the preceding operation, beginning at the level of the third dorsal spine and extending several centimeters farther toward the anterior chest. Very little bleeding is encountered in this stage because of the scar tissue which has been formed. After the rib bed has been exposed, the previous extra-pleural cavity which was formed by the Semb apicolysis in the first operation is again entered and opened widely. The ribs necessary for

a collapse of the underlying cavity are then resected. Usually, if a patient is in good condition, this number is four. A six-rib thoracoplasty often results in an over-riding of the scapula on the seventh rib, with an elevation of the shoulder and considerable annoyance from the sliding of the scapula over the rib. Often, this can be prevented by removing enough of the angle of the scapula to insure free movement.

After the ribs have been resected, the heavy bridge of scar tissue which has formed at the lower margin of the previous operation is cut away. The removal of this bridge aids materially in obtaining a better lateral collapse, and, to me, is probably the most important addition to the thoracoplasty operation in the past few years. We have seen many cases whose collapse was incomplete because of this heavy bridge of scar tissue. At this operation the transverse processes of the vertebra are routinely removed. Subsequent operations are carried out as indicated by the amount of collapse necessary to obtain cavity closure. By following out the Semb apicolysis, with the removal of the scar tissue bridge in the second operation, and the resection of the transverse processes, very few, if any, revision thoracoplasties are necessary. All thoracic surgeons are agreed that revision thoracoplasty operations carry a very high mortality rate, with poor results, so that enough should be done at the initial stages to minimize revision operations.

The statistics as to results obtained by thoracoplasty operations in all types of cavities show cavity closure in between 70 and 85 per cent of cases. To me, these figures are most significant in showing the value of this procedure; especially when we consider that without this

operation not more than 5 per cent of these cases would become arrested.

PHRENIC NERVE PARALYSIS

In 1911, Stuertz proposed paralyzing the hemidiaphragm in order to relax a diseased lower lobe. Following this was a wave of enthusiasm in phrenic nerve paralysis, and many thousand operations were carried out on patients where the indication for this procedure was absent, simply because technically the operation could be done by practically any surgeon. During the past few years, phrenic nerve paralysis has been more judiciously used and has become a valuable adjunct to collapse therapy, especially when combined with other procedures. It is particularly valuable in the treatment of bilateral tuberculosis and when used at the termination of a pneumothorax. I do not believe that it is indicated in early cases as an initial procedure as a substitute for pneumothorax, which is the ideal method of collapse. This opinion, however, is not held by Alexander or O'Brien. When it is realized that in interrupting the course of the phrenic nerve one of the largest body muscles is paralyzed, it should be done permanently only after much thought and consideration. The indications for a permanent phrenic paralysis are very few, and it is used in this clinic only following thoracoplasty where the whole side has been previously collapsed. Phrenic avulsion has become an operation of the past.

A temporary phrenic interruption is a revocable operation and is certainly the operation of choice in almost every instance. A temporary interruption is carried out by a simple crushing of the nerve with a haemostat; the diaphragm function returning in six to eight months. When this type of operation is carried out, diligent search should be made for accessory phrenic nerves, as these branches are very frequent and, when not severed, account for many unsuccessful diaphragmatic paralyses. These accessory branches, when encountered, should be severed.

Interruption of the course of the phrenic nerve should result in a paralysis of the hemidiaphragm, following which a rise of 2 to 8 centimeters results.

Bilateral phrenic interruption can and has been done, but the indications are rare. While a phrenic paralysis is frequently used on one side with some form of collapse therapy on the other, it is the opinion that bilateral phrenic interruption should not be done.

CLOSED INTRAPLEURAL PNEUMOLYSIS

By this is meant the severing of adhesions which have prevented the lung from completely collapsing following pneumothorax. In at least 50 per cent of cases, unsatisfactory collapse results following artificial pneumothorax because of adhesions between the lung and the chest wall. A thoracoscope is introduced into the pneumothorax cavity, usually through the anterior second or third interspace. This site is chosen because 90 per cent of adhesions are posterior. A dissecting electrode or cautery is introduced through another opening to sever the offending adhesion. String and cord adhesions are easily resected.

The method described by Coryllos enables one to remove many large adhesions in which lung tissue is contained. As these are frequently encountered, it has been a great aid in obtaining good collapse in many cases which would otherwise have been too dangerous to attempt. This method is carried out by making an incision through the pleura at the junction of the adhesion with the chest wall and then dissecting with a cold cautery the whole attachment, including the pleura, from the chest wall. In this way it is rare that lung tissue is entered, which is always a serious accident because of the resulting empyema.

Because of the frequency of adhesions encountered in pneumothorax therapy, it is impossible to carry out a collapse program without the use of this very valuable adjunct which was described first by Jacobaeus of Stockholm in 1913.

OPEN INTRAPLEURAL PNEUMOLYSIS

In this method, pleural adhesions are severed by opening the pleural cavity and freeing them under direct vision. This procedure has the many disadvantages of opening the pleural cavity so that it is used infrequently, although Davison and a few others prefer it.

EXTRAPLEURAL PNEUMOLYSIS WITH EXTRAPLEURAL PNEUMOTHORAX

In this procedure, the parietal pleura is stripped from the chest wall and the resulting cavity filled with some media. The filling of this space was usually carried out with paraffin or gauze; the paraffin pack being the popular substance used. Recently, a very much more extensive stripping was described by Graf and the resulting space closed tight so that it could be maintained by the filling with air under pressure. The procedure has been termed "extrapleural pneumothorax." During the past several months it has become increasingly more popular in collapse therapy and has opened new fields.

The operation is carried out by making a rather short curved incision between the vertebral border of the scapula and the vertebra, and down through the back muscles. One rib is resected, usually either the third or the fourth, and the extrafascial space over the parietal pleura entered by an incision through the periosteum. This space can be enlarged easily, so that the whole pleural dome can be dissected free, and the stripping is then carried down to the diaphragm; care being taken in making an air-tight closure, using the dissected free erector muscle group as a flap.

In order to maintain this cavity, pneumothorax must be administered frequently and the pressures maintained at much more positive levels than in the administration of ordinary artificial pneumothorax. Following the use of air fillings for several weeks, oil can be substituted and the space maintained easily with it. Following extrapleural pneumothorax, very little shock is encountered so that it can be carried out on patients whose conditions were not suitable for thoracoplasty. Many thousands of patients fall into this group so that this operation has extended the scope of collapse therapy markedly. It is also a very valuable procedure in dealing with bilateral cavitation. Later, it is necessary to collapse the air space

by a follow-up thoracoplasty to prevent reopening of the cavity as the lung reexpands.

OTHER METHODS

There are many other forms of collapse therapy less frequently used than the above-mentioned, such as: scalenectomy; multiple intercostal neurectomy of Alexander; oleo-thorax; ligation of the pulmonary artery;

ligation of the pulmonary veins; and pneumoperitoneum combined with phrenic paralysis. Lobectomy and even pneumonectomy have been attempted, but in the treatment of tuberculosis they are still in the realms of possibilities for future consideration because of the extremely high mortality rate encountered when they are carried out.

Advances in Thoracic Surgery*

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THORACIC surgery has made rapid advances in the past few years, and now there need be no more hesitation in operating upon the chest than in attacking any other part of the body. In this paper I will attempt to review the common conditions amenable to thoracic surgery and outline our present concept of their surgical management.

PULMONARY TUBERCULOSIS

Many cases of pulmonary tuberculosis are benefitted by thoracic surgery. Collapse therapy has been the outstanding development in the treatment of this disease within the recent years, and in our clinic every case of pulmonary tuberculosis is considered for some form of collapse treatment. If the diseased areas and cavities can be successfully compressed, many patients recover whereas, when cavities are allowed to remain open, the ultimate outcome is almost always unfavorable. The most satisfactory explanation for the benefit of collapse in my opinion is, that in a compressed state a relatively anoxic condition exists which is unfavorable for the development of the tubercle bacillus.

Pneumothorax is the ideal form of collapse and is applicable to the largest percentage of cases. If a free pleural space exists, air can be introduced simply through a needle. This air must be replaced at periodic intervals, and the desired degree of collapse maintained under the guidance of the X-ray and fluoroscope. Both lungs can be partially collapsed simultaneously or alternately. At the expiration of treatment the lung will re-expand and function quite normally, the pulmonary disease frequently remaining healed. Unfortunately, pneumothorax is not possible in every case because of adhesions between the parietal and visceral pleurae and in these cases surgical measures must be instituted.

The most valuable surgical collapse measure is the thoracoplasty. This operation is merely a technical procedure to collapse the lung, and has been developed taking into consideration the architectural structure of the chest wall. At present, after passing through various stages of development, the operation has become more or less standardized. Complete lengths of ribs are

resected from the transverse processes of the vertebrae to points close to the cartilage in front. The operation is performed in one, two or three stages, as may be necessary in the individual case, at intervals of several weeks with a resection of three or four ribs at each stage. Supplementary maneuvers such as the removal of the transverse process of the vertebra and mobilization of the apex after the manner of Semb¹ have been adopted in many clinics. While this may seem a drastic procedure, the fact remains that the operation is usually attended with very little shock, the mortality is low, the deformity not marked, and approximately 70 per cent of patients can be restored to useful places in society.

The most simple surgical measure is the phrenic nerve operation, which also has a helpful place in the treatment of other conditions and as an adjunct to various thoracic manipulations. The phrenic nerve can be located easily as it crosses the scalenus anterior muscle of the neck, and may be interrupted either temporarily or permanently; temporarily, by crushing or alcohol injection of the main nerve and section of accessory branches, permanently, by section of the main nerve and accessory branches or by the evulsion or exairesis of the main nerve. Following interruption of the nerve the hemidiaphragm becomes paralyzed and rises to the expiratory position. Subsequently, there will be further rise as a result of atrophy of the muscle and the effect of the pressure relationship between the pleural and abdominal cavities. The net result is usually considered to be a 25 per cent collapse of the lung. This may distinctly benefit certain pulmonary lesions and close small cavities, but the phrenic nerve operation does not have the positive value of pneumothorax or thoracoplasty. In most clinics the phrenic nerve operation is used chiefly as an adjunct to other procedures, and the temporary operation is used more frequently than the permanent one. Judiciously used, the phrenic nerve operation has a valuable place in our collapse therapy armamentarium.

Occasionally, the adhesions which limit a pneumothorax collapse may be strings or bands which can be cut, thereby rendering an ineffective pneumothorax collapse a satisfactory one. This operation is called intrapleural pneumolysis. Most surgeons favor the Jacobaeus² operation, which is the severance of adhesions by the

*The Harold S. Boquist lecture delivered at the University of Minnesota, under the auspices of the Minnesota Health Association, May 9th, 1938.

means of the closed operation involving introduction of the endoscopic instrument, similar to the cystoscope, into the thoracic cavity through the intercostal space. I have preferred to cut these adhesions through an open operation, feeling that larger bands can be cut more successfully and with greater safety. The more I use this method the more satisfied I am with the results and in the past several years I have had no untoward difficulties or complications.

In addition to these standard procedures we have a number of others of more or less limited application or questionable value. Various extrapleural packs, principally paraffin, have been tried and more or less abandoned, although they may have a limited field of usefulness. Cutting of the scalene muscles, intercostal neurectomy, open drainage of tuberculous cavities, adjunct or supplemental thoracoplasty operations, closure of the residual cavities by muscle transplants, and other procedures have been and are being used.

In recent years a comparatively new operation has been suggested, "extrapleural pneumothorax," and within the past few months I have attempted it in several cases with encouraging results. A section of the third or fourth rib is removed. The lung is separated from the chest wall in the fascial plane between the external surface of the parietal pleura and the endothoracic fascia. The apex is completely freed and the lung separated from the apical dome, the mediastinum, and the anterior, lateral and posterior chest wall, as far downward as may be desirable in the individual case. The remaining cavity is filled with saline solution and the soft tissues closed. Subsequently, the saline and bloody serum is removed faithfully from day to day and replaced with air, keeping a neutral pressure within this extrapleural space. There are certain theoretical objections and possible complications, but immediate results in my limited experience have been encouraging.

The program of control of tuberculosis lies principally in the recognition and isolation of open cases. Rapid progress is being made and efforts in the present direction seem to indicate that within a reasonable period of time the disease will be completely controlled. In the meantime, patients with the disease must be treated with the best methods we have at our command and there are few procedures in medicine or surgery as strikingly effective as collapse treatment in pulmonary tuberculosis. The benefits are not only to the individual but also to the community, in that successful collapse converts the patient to a negative case, so he is no longer a source of infection to others.

EMPYEMA

Empyema of the chest is a well-known condition which has been treated successfully for years, and yet the subject is confusing because of many modifications of treatment recommended. Progress in the treatment of this condition has been made in standardization of therapeutic procedures and in arriving at a better understanding of the principles involved. Any treatment which embodies fundamental principles will meet with more or less uniform success. We must differentiate

sharply between ordinary pyogenic types of empyema caused by bacteria such as pneumococcus, streptococcus, staphylococcus and those caused by tubercle bacillus. In the pyogenic forms the following important points should be religiously kept in mind: first, adequate drainage must be established and maintained. Second, a cure of the empyema is accomplished when the lung is re-expanded to meet the chest wall and the pleural space is completely obliterated. Any form of the treatment must show continued progress in this direction, as evidenced by volumetric determination of the capacity of the pleural cavity or X-ray studies. If the progress of the patient is not satisfactory, or the cavity becomes stationary, the usual answer is inadequate drainage and more effective drainage must be established or a chronic empyema may result. Third, an open pneumothorax is, under ordinary circumstances, not compatible with life for any period of time. Likewise, open drainage of an early empyema where the exudate is seropurulent in character may be associated with respiratory disturbances that will contribute to an unfavorable outcome. The report of the empyema commission appointed during the world war to study this problem, cautions that a closed form of drainage should be used in early empyemas until there has been sufficient inflammation to fix the mediastinum, or until the lung is firmly adherent to the chest wall over an appreciable area. Practically, it is almost always safe to establish an open drainage when the exudate is frankly purulent.

The conventional forms of drainage are the closed and the open drainage. Aspiration may be considered a form of drainage, and repeated complete aspirations of the pleural cavity may accomplish a cure in many cases of empyema, especially in childhood. It is my opinion, however, that aspiration should be used primarily for purposes of diagnosis, to relieve increased tension which is causing dyspnea and cyanosis, and possibly in the early cases until it is safe to establish an open drainage. The ordinary interpretation of the closed form of drainage is the insertion of a catheter through the intercostal space with the aid of a trocar. The usual point for establishment of drainage is in the region of the ninth rib in the posterior axillary line, but needless to say the tube must be introduced into the empyema space as located with the aspirating needle, and entrances higher or in other locations may be necessary. Through this tube, which is introduced only a short distance into the empyema cavity, the pus is aspirated and the cavity irrigated at frequent intervals, most commonly with Dakin's solution.

Mechanical devices have been suggested for the purpose of continuous aspiration, continuous irrigation, tidal irrigation, etc., all of which may have some advantages. Let me repeat that this form of drainage is satisfactory only as long as there is progressive improvement of the patient and progressive diminution of the size of the empyema cavity. Drainage must be maintained until the pleural space is virtually obliterated. The closed method of drainage, then, is mandatory in early empyema, uniformly satisfactory for empyemas in children, and effective in many cases in adults. The open form of

drainage with rib resections is generally favored by thoracic surgeons in the Chicago area as most effective in the management of the fully developed empyemas in adults. A rib segment three to five inches long is resected sub-periosteally over the point determined to be the logical site for drainage in the individual case. Local anesthesia is usually sufficient, the most satisfactory general anesthesia for this operation and chest work in general, being cyclopropane gas. A liberal opening is established and this opening faithfully maintained, with the aid of tubes and gauze packs, until the cavity is virtually obliterated, at which time the wound is allowed to close. We also have various modifications of the open operation and various adjuncts to the treatment, such as efforts to hasten re-expansion of the lung. However, the process of ablation of the pleural space seems to be a natural one which will occur progressively if the drainage is satisfactory in the absence of such conditions as malignancy and tuberculosis. Advantages of the open operation seem to be in shortening the period of convalescence, particularly hospitalization, and in requiring a minimum amount of care and irrigation. In favorable cases when the temperature is normal, patients can be encouraged to become ambulatory, often within a period of one to two weeks. The activity of the patient seems to aid the process of closure of the cavity. If these fundamental principles of treatment of empyema are observed, results will be uniformly satisfactory.

We still, however, are called upon to meet the very difficult problem of the chronic empyema. The first step here is to establish wide open drainage with the resection of multiple ribs and removal of the intercostal tissue. This in general, results in some improvement of the patient and some diminution in the pleural space. Later, plastic operations after the manner of the Schede³ thoracoplasty, completely unroofing the cavity so the chest wall will be collapsed down to the visceral pleura and measures to close bronchial fistulae, etc., may come into consideration.

The problem of the management of the tuberculous empyema formerly seemed a hopeless one, in view of the nature of the underlying pathology. However, through the efforts of Alexander⁴ of Michigan and others, the treatment of this condition has now been quite well standardized with amazingly successful results. We must consider three different divisions. First, is the simple tuberculous accumulation of pus with little underlying pulmonary pathology. Much can be accomplished here by simple repeated aspirations, with or without lavage of the pleural cavity with Dakin's or other solutions. (To minimize the danger of abscess of the chest wall and fistula the patient should be kept turned away from the needle puncture for a period of time after aspiration.) With patience and persistence we may find that soon there will be no further tendency for pus to reform and eventually we may even obtain a re-expansion of the lung. The replacement of the air and fluid with olive oil may be chosen, and this too, has resulted in apparent cures in a number of cases. Procedures to close the empyema cavity, principally thoracoplasty, have given many favorable results.

The second group is a simple tuberculous empyema with considerable underlying lung pathology, possibly open cavities. In these cases, aspiration, irrigation and oil likewise may be helpful, but if the condition of the other side permits, it is desirable to collapse the chest wall with the thoracoplasty operation, accompanied of course, by the removal of the purulent material. Bronchial fistula of a small size may be present and should encourage a use of surgical collapse.

A third group is the tuberculous empyema with secondary infection, with or without broncho-pleural or pleuro-cutaneous fistulae. Treatment in these cases will not be attended with uniformly good results, but nevertheless many can be saved. If no fistula is present the secondary infection can occasionally be overcome by repeated aspirations and irrigations, after which we will have the problem of the simple tuberculous empyema. If bronchial fistula is present, aspirations and irrigations may reduce the toxicity so that a radical thoracoplasty can be performed to obliterate the empyema cavity. The thoracoplasty is performed preferably before external drainage is established to minimize the danger of wound infection, but it may be wise to establish the open drainage early in order to improve the patient's general condition. In cases with an already present pleuro-cutaneous fistula, the procedure of choice usually is to enlarge the drainage opening with the view of improving the patient's condition to a point where he will tolerate the necessary thoracoplasty operation. In spite of adequate drainage, however, some of the secondarily infected tuberculous empyemas will not respond and continue their toxic course to unfavorable termination.

LUNG ABSCESS

Lung abscess is another surgical problem in which the advance has been primarily towards the standardization of therapeutic measures. About 50 per cent of lung abscesses develop following operations upon the upper respiratory tract, possibly more frequently when general anesthesia is used. There has been debate as to whether the abscess results from the aspiration of infected material, or whether the infection is carried through the blood stream. Probably infection occurs through both routes. Pneumonia, foreign bodies, metastases from other points of infection, trauma, etc., are the other etiological factors. The final diagnosis is made by the history, physical examination and laboratory tests. As in the case of other accumulations of pyogenic material, drainage must be established. Evacuation into the bronchus frequently occurs and this alone may constitute completely adequate drainage. We find that 75 per cent of lung abscesses heal spontaneously and therefore the only necessary treatment is the usual supportive measures.

In the remaining 25 per cent of cases, drainage through the bronchus will not be sufficient and surgical drainage must be established. The conventionally accepted plan is to continue ordinary medical measures as long as there is progressive improvement of the patient, diminution in the amount of sputum, and progressive closure of the abscess cavity as evidenced by X-ray examination. However, if after an arbitrary period of six to twelve

weeks there is still temperature, sputum and an abscess cavity of significant size, surgical drainage should be instituted. While each abscess presents different problems, the general outline of surgical drainage is as follows: The abscess is localized as well as possible by physical and laboratory measures. The most significant localizing finding in my experience was given to me by the late Carl Hedbloom⁵. He stated that the point of maximum dullness to percussion is the point where the pathology is nearest the surface. Advance roentgenological facilities, if available (laminography) might be more accurate. A rib resection is performed over the chosen point and the external surface of the parietal pleura exposed. If the pleura is thin and transparent and we can see the underlying lung mottling, there are probably insufficient adhesions to make it safe to enter the lung abscess at the first operation. If the pleura is thick and opaque and resistant, there are adhesions so that drainage can be established at one sitting. To transgress the free pleural space and enter the lung abscess would mean a spontaneous collapse of the lung and its associated disturbances and the development of empyema, which might prove disastrous. Most frequently we pause at this point and tuck a gauze pack against the outer surface of the parietal pleura over an area of four to six square inches, close the soft tissues, and allow the pack to remain in place for one week, during which time the inflammation caused by the gauze will have resulted in the formation of adequate adhesions.

At the second stage the abscess is located with the aspirating needle by the recovery of purulent material or foul smelling air. The lung is then entered, principally with the use of electro-coagulation, cautery or blunt dissection. A liberal drainage opening is established and the septa between communicating pockets broken to insure adequate drainage. A gauze pack is inserted snugly into the abscess and along the course of the drainage tract, which is maintained patent with the aid of tubes and packs until the abscess cavity has granulated and shrunken down to a minimum size, after which the wound is allowed to close gradually from the base. Results of surgical drainage at the proper time are more or less uniformly satisfactory and successful. However, the surgical results are usually judged by results in those cases of chronic multiple abscess which have been neglected and kept for too long a period of time under conservative management. Also, there may be other problems such as the necessity of surgical obliteration of the residual space, treatment of bronchial fistula, etc. The conventional medical treatment for years has been the intravenous injection of neosalvarsan, and this drug probably should be used wherever there is a predominance of spirochetes in the sputum. Bronchoscopic drainage undoubtedly has a place in the treatment of lung abscess and occasionally the opening into the abscess cavity can be enlarged, thereby improving drainage. Postural drainage methods are helpful. Preparations containing iodides and guaiacol have been recommended. Pneumothorax treatment of abscess, in my opinion, is to be condemned. I have recently seen two cases which developed empyema following pneumothorax treatment, and the presence of

a pneumothorax definitely conflicts with a program of surgical therapy. The introduction of a needle into the lung for the purpose of diagnosis without the accurate knowledge of an obliterated pleural space can definitely be condemned. Chronic multiple abscesses become virtually the same problem as extensive chronic bronchiectasis with abscess formation and will be considered under that heading.

BRONCHIECTASIS

Bronchiectasis is a condition of dilatation of the bronchi, which presents one of our most difficult surgical problems. Varying degrees and types of involvement occur and, although the left lower lobe is most frequently affected, any one or multiple lobes may be involved. Congenital and acquired types are recognized. The factors in the development of the acquired type are: first, an infection weakening the bronchial wall, and second, a dilating force. This dilating force probably is the atmospheric pressure acting against the negative intra-thoracic pressure.

Symptoms in bronchiectasis are manifest when infection is present and the conventional forms of treatment are largely directed towards overcoming this infection. Removal of foci of infection, postural drainage and climatic changes have often resulted in some benefit. Bronchoscopic drainage has some value. The phrenic nerve operation has been strongly advocated, but observations of many unfavorable results have cast a shadow of doubt as to the efficiency of this procedure. X-ray treatment recently has been suggested, but I fail to see how it can be of great benefit. Instillation of lipiodol as a therapeutic measure has been used, usually with only temporary benefit. Pneumothorax is usually impossible because of adhesions, and thoracoplasty has given very little encouragement.

The usual story is that of only transient improvement and almost inevitably there will be succeeding re-infections of greater severity with increased pulmonary damage and discouraging results. The general opinion among thoracic surgeons is, that the only complete cure consists in removal of the diseased tissue, lobectomy. This operation has been formidable in the past, but as a result of improved understanding of the physiology of the chest, added experience, and better standardization of the operative procedure, we now find many successful reports, some with mortality comparable to other generally accepted surgical procedures. In a young individual with pronounced symptoms, cough, sputum, and toxemia where the disease is limited to one lobe, lobectomy should unquestionably be seriously considered.

Every surgeon has different points in technique, but the general tendency is to favor a single stage operation. The approach is made with the removal or section of one or more ribs in a location that will be most advantageous for exposure of the hilus of the lobe. The lobe is freed and a mechanical ligature placed around the

OTHER FIELDS

Surgery of the diaphragm, esophagus, thoracic sympathetic chain, and the problem of management of hilus. The diseased tissue is then cut away and the blood

vessels and bronchi secured with great care. Subsequently, there will be problems such as maintaining proper pressure relationships, combating the inevitable infection of the pleural cavity, and filling in the residual space. The closure of this space is usually accomplished by compensatory expansion of the remaining lobe, possibly aided by paralysis of the diaphragm. Sometimes a thoracoplasty operation is required.

In some cases a two stage operation is preferable. Removal of multiple lobes is not impossible. Extensive chronic bronchiectasis with abscess may be best handled by cauterly lobectomy as suggested by Graham⁶. This operation consists in a gradual destruction of the diseased tissue in several stages. Although perhaps the only resort in this type of case, it has proven too extensive to receive general acceptance.

CARCINOMA OF THE LUNG

Tumors of the chest wall, the mediastinum and the lung also come within the field of thoracic surgery. The most important of these is a primary bronchiogenic carcinoma. While this condition was considered very rare a few years ago, we now find it comprises about two per cent of all primary malignancies. The increase may be merely relative and accounted for by increase in the life span and more accurate diagnosis, or may be absolute as a result of the increase in smoking or the increase in inhalation of various irritating gases and fumes in our present civilization. The possibility of carcinoma of the lung must be kept in mind in patients in the cancer age. Chest pain, irritative non-productive cough, or hemoptysis may be early symptoms, or the first evidence may be circulatory obstruction or metastasis to other parts of the body. The principle physical findings are those of the atelectasis which occurs as a result of the bronchial obstruction, namely, impaired resonance and diminished to absent breath sounds over the affected area. Likewise, the predominant X-ray finding is often a wedge-shaped shadow of atelectasis which may involve only a lobule or a complete lobe or the complete lung. The presence of superficial lymph node involvement may occasionally show metastasis, and in several cases we have been able to find malignant cells in the sputum or pleural exudate in cases where other measures have failed. The presence of bloody pleural fluid suggests a malignant condition of the lung or pleura. Bronchoscopic examination with biopsy most frequently leads to definite confirmation of diagnosis.

The only possibility of recovery lies in surgical removal of the tumor, and this usually means removal of the entire lung. Graham⁷ was the first to successfully remove a lung for carcinoma, and since then there have been many isolated encouraging successes. Certainly in view of the outlook of the inevitable exitus without surgery, cases in which no definite metastasis can be located should at least receive the benefit of exploration in spite of the formidableness of the operation. crushing and perforating injuries to the chest wall belong within the sphere of thoracic surgery, but we will not have time to discuss them at this time.

HEART

Many outstanding medical figures have insisted that

operations on the heart would be impossible. Nevertheless, as stated by Cutler,⁸ the heart can be manipulated as any other organ or tissue. Isolated reports of repair of injuries of the heart have been reported, and now, clear indications for such operations are recognized. Delorme in 1898⁹ suggested resection of the pericardium for cases of adhesive pericarditis and recently numerous successes have placed this procedure in a generally accepted classification. Purulent pericarditis requires surgical drainage. Bold attempts have been made to enlarge cardiac valves in cases of stenosis, and Cutler and Beck¹⁰ have performed such operations with some apparent success. Allen and Graham¹¹ have devised operative procedures and surgical instruments called cardio-valvulotomes.

Successful repair of aneurisms have been reported. Trendelenburg in 1908¹² reported a series of cases with removal of pulmonary thrombi and this operation bears his name. Attempts have been made to relieve angina by resection of the cervicle sympathetic chain, Jonnesco,¹³ and by thyroidectomy, Blumgart¹⁴, Levine and Berlin. Attempts to relieve hypertension by section of the thoracic sympathetic chain and the splanchnic nerves have also been made with temporary successes.

More recently recognizing the mortality from interference with the circulation of the heart itself, coronary occlusion, Beck¹⁶ and also O'Shaughnessy¹⁷ have performed operations to encourage collateral circulation by bringing the omentum up through the diaphragm and tacking it to the heart and pericardium. Immediate results have been encouraging.

CONCLUSION

In view of already attained unbelievable successes, we can not be too skeptical as to the possibilities for the future.

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Clinical Studies of Primary Carcinoma of the Lung*

An Analysis of 70 Cases, 20 of Which Were Treated by Pneumonectomy or Lobectomy

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THE control of primary carcinoma of the lung is now confronting the medical profession as an important practical problem because this disease is a relatively common cause of death, and is one for which we now have an effective means of treatment. It is the purpose of this paper to indicate the prevalence of primary carcinoma of the lung, its early clinical manifestations, the available methods of diagnosis and treatment, and to present an analysis of 70 histologically proven cases studied by the authors, 20 of which were treated by pneumonectomy or lobectomy.

The study of autopsy material from general hospitals, where the majority of cases treated are unselected, provides by far the most accurate method of determining the occurrence of a disease and its relative importance as a cause of death. In a recent survey of 52,305 autopsies reported by various authors (Table I) it was found that approximately 10 per cent of all cancers occurring in this group were primary cancers of the lung. Also, in a statistical study by Dublin¹ it was found that cancer was in second place in the list of causes of death, being responsible for the demise of approximately 150,000 persons annually in the United States. From these figures it can be calculated that primary carcinoma of the lung kills approximately 15,000 people in this country each year. It is rather startling to learn that in the group of 7,685 consecutive autopsies done in the Cleveland City Hospital, reported by Koletsky,² the lungs were the second most frequent site of origin of primary malignancy, the stomach being the only organ affected more frequently. Also in the series of 6,800 consecutive autopsies reported from the Cook County Hospital by Jaffe³ the lungs were in third place, the stomach being first and the intestines second in this group. The great increase in the prevalence of this disease is due not only to a relative, but to an absolute increase in frequency, as is shown conclusively by the statistical study by Simons.⁴

Our sole weapons against cancer today are radium, X-ray, and surgery. Unfortunately, the first two have failed completely in the treatment of cancer of the lung, since the most frequent forms of bronchiogenic neoplasms are highly radio-resistant. The deliverance of a dosage to the center of the lung of sufficient potency to kill even less radio-resistant tumor cells results in irreparable damage to the lung tissue. Graham⁵ has pointed out that there is no verified case of a five-year cure by irradiation on record. Many authorities are even doubting the advisability of using irradiation as a palliative measure. The use of this type of therapy in the presence of secondary infection may aggravate the inflam-

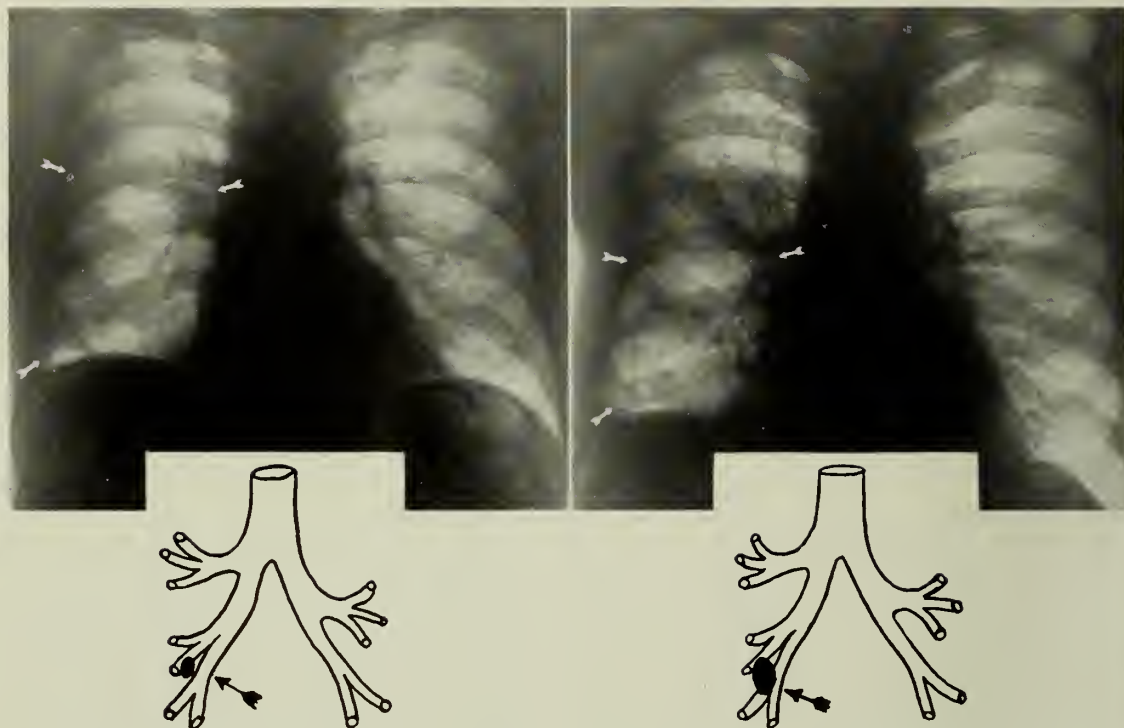
matory process and actually shorten life. Treatment of primary carcinoma of the lung by bronchoscopic fulguration has been reported. Many of the so-called "cures" by this method were in cases of mistaken identity of the tumor. It is conceivable that a carcinoma occurring as a small pedunculated or polypoid growth may be recognized at a stage when its complete removal endobronchially is possible, but cases suitable for such treatment are extremely rare. In our experience, we have seen but one.

Surgical excision of one lobe or an entire lung at the present time offers the patient by far the best chance of survival. The operative mortality rate of 26 per cent in the authors' series of pneumonectomies, carried out for malignant and suppurative lesions, is certainly not prohibitive when we realize that we are dealing with an otherwise 100 per cent fatal disease. That the person who has been subjected to pneumonectomy is capable of carrying on a normal life with regard to the strain of ordinary physical activity is a rather surprising but proven fact, since the majority of survivors in the authors' series have returned to the various activities in which they were engaged preoperatively. The number of patients who will be cured of primary carcinoma of the lung will be dependent largely upon how efficiently we, as members of the medical profession, cooperate in establishing the diagnosis of this disease at an early period, so that surgical excision can be carried out before extension has occurred.

CLINICAL AND PATHOLOGICAL CONSIDERATIONS

The great variation in the symptoms and findings present in primary carcinoma of the lung can be better understood if we first consider the various pathological processes that produce them. The general opinion today is that all of these neoplasms arise from a single parent cell located in the basal layer of the bronchial epithelium, regardless of whether the point of origin is in the main stem bronchi or in the peripheral bronchioles.⁴ The degree of differentiation of this parent cell determines whether the tumor will be a squamous cell carcinoma, adenocarcinoma, or an undifferentiated round cell, spindle cell, or oat cell type, or a combination of these which is seen not infrequently. Regardless of the type of tumor present, the symptoms and findings are essentially the same and can be conveniently subdivided into various stages from a clinicopathological standpoint. This subdivision obviously will not be applicable to every case, but will aid in correlating the clinical manifestations with the pathological lesions in most instances.

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(A). Early stem bronchus carcinoma involving the postero-lateral branch of the right middle lobe bronchus with complete obstruction. Note wedge-shaped segment of decreased density limited by convex margins indicating localized emphysema due to partial obstruction of bronchus to that segment. Note that a discrete shadow of the tumor itself is not shown.

(B). Same patient 12 weeks later. The emphysematous segment has decreased in size and there is an area of increased density above the emphysematous segment indicating an atelectatic process resulting from complete obstruction of the apical branch bronchus of the lower lobe. At this time secondary infection was also present.

Fig. 1.

I. Stage before bronchial occlusion.

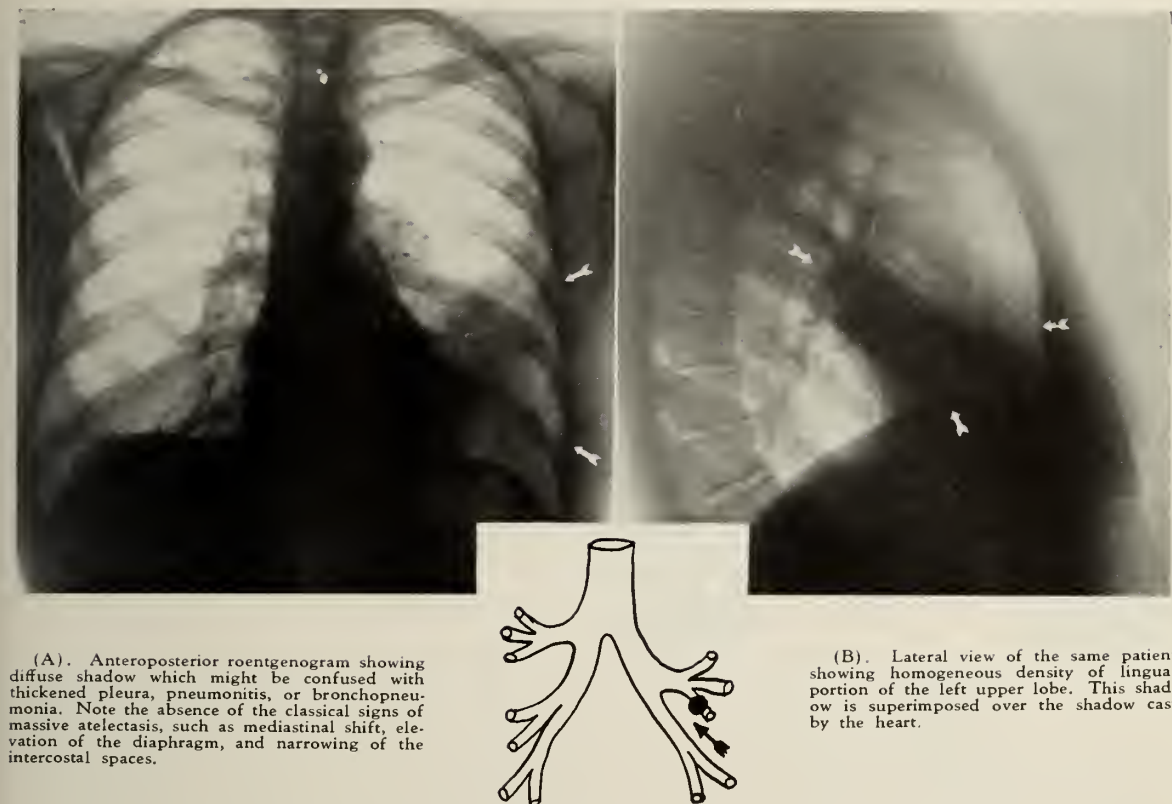
As the tumor grows, it causes irritation of the sensitive bronchial mucosa, which results in a dry, irritative, and at times spasmodic cough. This is by far the most constant and most important early symptom. Inasmuch as the cough is ineffectual in relieving the irritation, bronchial secretion is produced in excess, which is an attempt on that part of the body to wash away the irritant. This results in the expectoration of clear, thin, odorless, mucoid sputum, which is very commonly present at an early period. Due to the trauma from coughing and to the tendency for tumor tissue to undergo degeneration, the surface of the lesion often becomes ulcerated, resulting in the appearance of small amounts of blood in the sputum. Massive hemorrhage is uncommon and when it occurs, the disease is almost invariably in an advanced stage. With ulceration, infection frequently occurs, so that the sputum becomes more or less purulent. During this stage, positive physical findings and abnormalities on the roentgenogram would not be expected, inasmuch as the tumor itself is too small to cast a shadow and the results of bronchial occlusion have not appeared. Still, it is very important to realize that the majority of cases can be diagnosed definitely by bronchoscopic examination. Furthermore, histological proof, even at this early stage of the disease, may frequently be obtained, since 75 to 90 per cent of primary carcinomata of the lung

lie within the range of bronchoscopic visibility⁴ and yield tissue for biopsy. It is hoped that in the future more cases will be seen during this early period, since the chance of cure at this time should be very good just as it is in any cancer where complete excision can be carried out before extension has occurred.

II. Stage of bronchial occlusion.

A. Incomplete occlusion with emphysema.

With further growth of the tumor, the lumen of the affected bronchus soon becomes partially occluded. In spite of this, air can still be drawn forcibly past the obstruction into the segment of lung supplied by this bronchus during the powerful inspiratory phase of respiration; but since expiration is dependent mainly upon the relatively weak elastic recoil of lung tissue, only a small amount of the inspired air can be forced out through the narrowed bronchial lumen before the next inspiration. Thus, the affected lung segment becomes distended with air and emphysematous. Wheezing or an asthmatic type of breathing frequently appears during this early stage and at times is very distressing. On physical examination a hyperresonant percussion note is heard and the breath sounds are emphysematous in type with a prolonged expiratory phase, during which time wheezing râles or rhonchi may be heard. On the roentgenogram is seen a wedge-shaped segment of decreased density, limited from the normal lung tissue by convex margins



(A). Anteroposterior roentgenogram showing diffuse shadow which might be confused with thickened pleura, pneumonitis, or bronchopneumonia. Note the absence of the classical signs of massive atelectasis, such as mediastinal shift, elevation of the diaphragm, and narrowing of the intercostal spaces.

(B). Lateral view of the same patient showing homogeneous density of lingual portion of the left upper lobe. This shadow is superimposed over the shadow cast by the heart.

Fig. 2. Primary Carcinoma of the Lingual Branch of the Left Upper Lobe Bronchus.

extending from the hilum to the periphery, as shown either in the straight anteroposterior film or in the lateral or oblique exposures (Fig. 1). This stage of the disease is apt to be relatively short, due to the rapid growth of the tumor which soon produces complete obstruction resulting in atelectasis. During this period, an erroneous diagnosis of asthma is not infrequently made.

B. Complete occlusion with atelectasis.

After the tumor blocks the bronchus completely, the air distal to the obstruction becomes absorbed within a few hours. As a result of this, the corresponding segment of lung becomes airless and collapsed, so that it occupies a smaller volume in the thorax than it normally does. Due to the decreased lung volume, the mediastinum shifts toward the affected side, the diaphragm becomes elevated, and the intercostal spaces narrowed, in order that the intrathoracic pressure may be equalized in the two pleural cavities. The dyspnea, which is very often noticed at this point, is due not alone to the decreased lung volume, but also to the shift in the mediastinum, which interferes with cardiac action. The chest pain or discomfort, usually described as a dull, heavy ache or a sense of constriction, is probably due to a reflex spasm of the intercostal muscles and the smooth muscle in the bronchial tree. Pain of any great severity, however, is not a part of the symptomatology of primary carcinoma of the lung at an early stage, except when secondary infection produces pleuritis. The physical

findings present during this stage of the disease are those typical of atelectasis, i. e., dullness to flatness on percussion, decreased tactile fremitus, diminished whispered and spoken voice, and diminished breath sounds which, if audible at all, are of bronchovesicular or bronchial quality. Evidence of mediastinal displacement toward the affected side, of diaphragmatic elevation, and of narrowing of the intercostal spaces may at times be present. Again, the findings on roentgenological examination are due to atelectasis which typically produces a dense, homogeneous, wedge-shaped shadow with concave margins extending from the hilum out to the chest wall. (Fig. 1-B and 2). This shadow may be associated with a varying amount of mediastinal shift toward the affected side, of diaphragmatic elevation, and of narrowing of the intercostal spaces. It is very important to realize that if the atelectatic segment of lung extends anteriorly or posteriorly from the hilum, the shadow on the roentgenogram may not appear to reach the chest wall in the usual anteroposterior film, although it may be clearly shown to do so in straight lateral or oblique views. Thus, if there is any question at all, these additional films should be taken.

C. Bronchial occlusion with infection.

Due to the involvement of the mucosa and the obstruction of the bronchus by the enlarging tumor, the ability of the ciliated epithelial cells to sweep out contaminating microorganisms, which are aspirated into the bronchial tree, is impaired; so that infection almost in-



Fig. 3. Primary carcinoma of the right main stem bronchus which completely occluded the lower lobe bronchus and partially occluded the upper lobe bronchus. Note the marked shift of the mediastinal structures, the elevation of the diaphragm, and the narrowing of the intercostal spaces. The multiple cavities are due to secondary infection and lung excavation. The changes shown in this film are compatible with a diagnosis of multiple abscess of the lung, far-advanced tuberculosis or fibrothorax following long-standing suppuration. Bronchoscopy established the diagnosis.

variably occurs. This may progress into any stage, thus producing bronchitis, bronchiectasis, varying degrees of pneumonitis, abscess, or even gangrene of an entire lung. Fever was present in 43 per cent of 1112 cases collected by Simons.⁴ The frequent occurrence of secondary infection associated with primary malignancy of the lung forces us always to be on guard, so that we will not be found guilty of treating a patient for "unresolved pneumonia," or "chronic bronchitis" while he dies of primary carcinoma of the lung. The symptoms, physical findings, and roentgenological changes which appear during this stage of the disease will obviously vary a great deal depending upon the point at which the bronchial tree is occluded, the virulence of the organisms, and the nature of the predominating infectious process present at any given time. If infection progresses behind a tumor which completely occludes a bronchus and thus prevents drainage from the affected area, the patient may become acutely ill, presenting the clinical picture of pneumonia. Drainage may suddenly be reestablished by a breakdown of the obstructing tumor or decrease in the edema. The patient may then expectorate a large amount of foul sputum, after which he will again feel relatively well,

until the bronchus again becomes occluded, when the acute pneumonic symptoms will reappear. Such a sequence of events is not uncommon and is responsible for the erroneous diagnoses of "recurrent" and "unresolved" pneumonia which are made at times. If cavitation occurs due to infection alone or in association with a breakdown of the tumor, the patient will very likely present the clinical picture of lung abscess, with expectoration of copious amounts of foul purulent sputum. Actually, that would be the predominating pathological process present during this phase of the disease. As might be expected, the physical findings and roentgenological changes may be just as varied as the symptoms, inasmuch as they too may be the result of any combination of pathological lesions. Thus on the roentgenogram, single or multiple cavities, with or without fluid levels, may appear in the area supplied by the affected bronchus, and the sharp outlines of the atelectatic shadow may be blurred and irregular due to adjacent pneumonitis (Fig. 3). However, the fundamental changes are due to the bronchial occlusion with emphysema or atelectasis, and the additional changes occur as a result of the superimposed inflammatory processes.

III. Stage of extension or metastasis.

There are many other symptoms, physical signs and roentgenological findings that are due to extension of the tumor or to metastasis, such as dysphagia, abnormal central nervous system symptoms and findings, phrenic nerve paralysis, dilated veins, diffuse carcinomatous infiltration of the lung, and so forth. These are all signs of the disease when the possibility of cure has passed, and are therefore relatively unimportant clinically.

The above division of the symptoms and findings into phases or stages is based upon the pathological changes that appear during the course of the disease. Thus, the division is not a strict and unyielding one. This is true because, for example, a tumor arising in the middle lobe bronchus may produce complete atelectasis of the entire middle lobe; while at the same time, the extrabronchial portion of the same tumor may be causing incomplete obstruction of the main bronchus of the lower lobe, so that in this part of the lung emphysema may be present. Therefore, in this particular case, symptoms, physical findings, and roentgenological changes which are characteristic of both these stages may be present at the same time (Fig. 1). Furthermore, if inflammatory changes are superimposed, still another stage may be represented. It should be emphasized that the size of the occluded bronchus is very important in determining the severity of symptoms and the prominence of physical findings and roentgenological abnormalities present at any stage of bronchial occlusion. If a main stem bronchus is occluded partially or completely, the symptoms will be distressing, and the objective manifestations will be unquestionable; but if a small bronchiole is involved, the symptoms will be slight or absent, the physical signs will be limited to a small area, so that they will almost certainly be overlooked, and the changes on the roentgenogram will be minimal. It must be remembered that the emphysematous or atelectatic segment of lung that appears on the roentgenogram may not correspond to

TABLE I.
Incidence of Primary Carcinoma of Lung in Autopsies.

Author Reporting Cases	Reference	Total Number of Autopsies	Total Number of Carcinomata	Number of Primary Carcinomata of Lung	Percentage of Primary Carcinomata of Lung of Total Carcinomata
Jaffe	3	6800*	876	100	11.4
Jaffe		4500			10.7
Koletsky	2	7685	1064	100	9.4
Frissell & Knox	9	2415	442	38	8.5
Matz	10	7398	1167	160	13.7
Various Authors Reported by Simons	4	30307			6.3 to 18.5

*Not included in total of 52,305 because it is included in 30,307 reported by Simons.

TABLE II.
Occurrence of Symptoms in Authors' Cases

Symptoms	STEM BRONCHUS GROUP 52 CASES		PERIPHERAL GROUP 16 CASES		ENTIRE GROUP 68 CASES*	
	Number with Symptom	Per Cent with Symptom	Number with Symptom	Per Cent with Symptom	Number with Symptom	Per Cent with Symptom
Cough	46	88.4	13	81.2	59	86.7
Fever	29	61.5	7	43.7	36	52.9
Pain or discomfort	21	40.3	9	56.2	30	44.1
Hemoptysis	18	34.6	8	50.0	26	38.2
Weight loss	18	34.6	8	50.0	26	38.2
Dyspnea	16	30.7	5	31.2	21	30.8
Weakness	10	19.2	1	6.2	11	16.1
Chills	8	15.3	0	0.0	8	11.7
Gastro-intestinal symptoms	5	9.6	1	6.2	6	8.8
Wheezing or Aschma	5	9.6	0	0.0	5	7.3

Note: Sputum not represented but was present in majority of cases with cough.

*68 cases used as total in studying symptoms because in two cases the histories were unreliable.

the gross anatomical position of any one of the five main lobes because, in the first place, the affected bronchus may be a small branch of one of the lobar bronchi, which would therefore cause changes to occur in only a part of one of the main lobes. In the second place, the affected segment is apt to be distorted, in the case of emphysema by a process of distension and enlargement, and in the case of atelectasis by a process of collapse and shrinkage. No mention has as yet been made of the shadow cast by the tumor itself, because in the majority of cases this does not appear at an early stage. Peripherally-located tumors are more apt to cast a shadow on the roentgenogram at an earlier period than the stem bronchus growths. At times the shadow appears as a rounded area of increased density with a distinct outline limiting it from the surrounding lung tissue; while at other times, the outline may be more indistinct, hazy, and infiltrative in character.

ANALYSIS OF AUTHORS' SERIES OF CASES

Seventy cases have been studied clinically, in which the diagnosis of primary carcinoma of the lung has been proven histologically. The age varied between 30 and 68 years, the average age being 51 years. Fifty-one of the patients were males, while only nineteen were females. No significant predisposing etiological factors could be found. The cases were divided into two groups, stem bronchus lesions and peripheral lesions. This division was arbitrary, the main practical differences being that preoperative proof of the diagnosis in the latter group was more difficult, inasmuch as the lesions were out of the range of bronchoscopic accessibility, and also some of the latter lesions were treated by lobectomy rather than pneumonectomy.

SYMPTOMS

The symptoms found and the relative frequency of occurrence in the two groups is shown in Table II. Cough was by far the most common and earliest symptom, being present in 87 per cent of the group. At the onset it was dry and irritative in nature, but soon became productive of a thin, mucoid sputum. As the disease progressed, it became more purulent in nature, depending upon the amount of ulceration and infection that developed. There were no characteristics found by means of which the sputum could be definitely differentiated from that found in other respiratory lesions. Fever was present at a relatively early stage in 53 per cent of the cases, and was found to be more frequent in the stem bronchus group. This again brings up the importance of recognizing the frequent occurrence of secondary inflammatory changes, which often dominate the clinical picture and mask the true nature of the primary lesion until the operable stage of the disease has passed.

Chest pain or discomfort, which varied from a heavy sense of constriction or weight to a severe gnawing pain, was present in 44 per cent. During the early stages of the disease, discomfort was common but pain of any great severity was not found, except when pleurisy occurred as a result of secondary infection.

Hemoptysis was present in 38 per cent of the total group. This was at first merely streaking of the sputum with bright red blood, and less frequently by raising of old blood with a brownish-red color. As the disease progressed, the amount of blood tended to increase but at no time, in most cases, was the hemoptysis copious.

Dyspnea or wheezing were present in 38 per cent of the cases and were very important early symptoms.

Groups or complexes of symptoms which might be called characteristic of carcinoma of the lung could not be determined from a study of this series of patients.

PHYSICAL FINDINGS

Abnormal physical findings in some form were present in 93 per cent of all cases at some time, but due to the fact that they were extremely variable and not characteristic, little reliance was placed upon them. When they were present, they frequently simulated the findings presented by the conditions from which carcinoma of the lung must be differentiated.

ROENTGENOLOGICAL FINDINGS

By far the most frequent roentgenological findings were those incident to bronchial occlusion which, in the great majority of cases, produced the shadow of atelectasis, while in some instances emphysema appeared. These findings appeared in lobar or lobular distribution with the associated changes in the thoracic cage and mediastinum, previously mentioned, in 77 per cent of all the cases. The homogeneous, dense, wedge-shaped shadow with concave limiting margins typical of uncomplicated atelectasis, was frequently altered somewhat by the associated infectious processes present; so that not uncommonly the limiting margins were more or less hazy and the shadow somewhat mottled. The shadow of the tumor itself appeared in only 19 per cent of the cases and in the majority of these it was peripherally located. In only 4 per cent of the entire group was the roentgenogram negative. Massive pleural effusion was found in 13 per cent of the cases, the majority of which were found to be inoperable. However, it must be remembered that an effusion may be caused by inflammation while the carcinoma is still at an operable stage.

DIAGNOSTIC PROCEDURES

1. *Bronchoscopy.* In 76 per cent of the patients in this series, the tumor was located in the stem bronchus. In 90 per cent of this group, bronchoscopy yielded tissue for biopsy. Bronchoscopic examination is by far the most important diagnostic procedure available at present. In the majority of cases of primary carcinoma of the lung the diagnosis can be proven by bronchoscopic biopsy at a stage before physical findings or roentgenological changes appear. When we consider that all other diagnostic procedures furnish merely presumptive evidence of the presence of cancer, there seems to be little real justification for postponing bronchoscopic examination in a patient presenting definite, suggestive, unexplained symptoms. We believe that any patient who develops a persistent cough, alone or associated with hemoptysis, wheezing, dyspnea, chest discomfort or other suggestive symptoms that cannot be definitely accounted for by the presence of some other lesion, should be given the benefit of bronchoscopic examination. This is especially true if the patient is middle-aged or past, and previously has been in good health.

The importance of delay in making a diagnosis can be better appreciated if we realize that we are dealing with a disease in which the time from the appearance of

symptoms until death is very short, as shown in the following group: Jaffe—approximately 5 months; Frissell and Knox—approximately 7.5 months; Koletsky—approximately 8.9 months. A thought expressed by Rienhoff⁶ is appropriate: "Our clinical pace must be quickened, for until recently the great majority of recognized affections of the respiratory tract have been those in which Time was felt to be the Great Healer, but since the development of methods by which patients cannot only be relieved, but cured of malignant neoplasms of the lung, it may be said that Time now takes on the rôle of executioner."

In addition to being the most important diagnostic procedure available, bronchoscopy also has other great merits. If the trachea is found to be fixed or distorted, or the angle of the carina widened, we have fairly good evidence that mediastinal extension of the tumor has occurred and that the above findings are due to the growth of malignant tissue around the bifurcation of the trachea. If the tumor is found to extend well into the wall of the trachea, we have evidence that resection may be impossible from a technical standpoint. In cases where suppuration distal to an occluded bronchus is undermining the patient's health, remarkable improvement may follow dilation of the occluded bronchus which allows drainage of the products of suppuration to take place. The general condition of the patient may improve remarkably and he may become a fit subject for surgical treatment. We should be aware of the fact that a patient may be seriously ill as a result of pulmonary suppuration and still have a carcinoma that has not spread beyond the lung. Such a patient surely deserves to have a bronchoscopic examination and whatever treatment, either endobronchial or surgical, that may be deemed necessary by the thoracic surgeon, since this will afford him his only chance of survival.

2. *Bronchography.* Instillation of lipiodol may aid in the diagnosis of tumors which are out of the range of bronchoscopic vision, but we feel that there is no indication for it when the tumor can be seen by means of the bronchoscope. At best, the information given by bronchography is presumptive.

3. *The method of demonstrating malignant tissue in the sputum,* as reported by Dudgeon and Wrigley,⁷ and later by Barrett,⁸ may aid in establishing the diagnosis in certain cases. In a limited series of our cases, this method has proved disappointing.

4. *Aspiration biopsy* is a dangerous procedure, since pleural infection may follow withdrawal of a needle from an infected lung, and we feel that it has no clinical use, except to establish the diagnosis in cases which are obviously inoperable. This statement is believed to be true for if the biopsy is positive in a suspected case without clinical evidence of metastasis, exploratory thoracotomy is indicated; and if the biopsy is negative in the same type of case, the same exploration is still the next step in its management.

5. *Exploratory thoracotomy.* We feel that exploratory thoracotomy is indicated in any case in which the presence of primary carcinoma of the lung has been

demonstrated or is suggested by definite unexplained symptoms, findings, or roentgenological changes, just as an exploratory laparotomy is indicated in a suspicious lesion in the stomach or bowel, where the presence of malignancy cannot be excluded. Fortunately, in the majority of instances the diagnosis can be definitely established preoperatively by bronchoscopic examination. The lesions which are beyond the range of bronchoscopic visibility will be situated in the substance of the lung and their presence may be verified by inspection and palpation at the time of exploration. Before thoracotomy is done, a careful neurological examination should be done to rule out obvious central nervous system involvement. Skeletal roentgenograms should be taken to rule out the presence of metastases to the bones. Fluoroscopic examination should be done to exclude the presence of diaphragmatic paralysis, since this is almost a sure sign of extension of the disease. Mediastinal infiltration should be ruled out by bronchoscopic examination, and if cervical glands are enlarged, a biopsy for possible metastatic disease should be done.

OPERABILITY

Evidence of metastasis upon clinical examination was found in 23 (33 per cent) of the 70 verified cases studied. Exploratory thoracotomy was carried out in 39 patients (56 per cent). Nineteen of these (49 per cent of the explored cases) were considered inoperable after exploration. The operation was continued and a lung resection carried out in 20 (pneumonectomy in 16; lobectomy in 4). In two patients, apparently operable after exploration, evidence of metastasis was found at the conclusion of the resection. Two patients showing invasion of the chest wall were treated by resection of both lung and a portion of the chest wall. In the final analysis we were left with 16 patients (22 per cent of the entire group) who presented no demonstrable sign of metastasis or extension of the primary lesion.

RESULTS OF SURGICAL TREATMENT

Three of the four patients treated by lobectomy survived the operation. Two of the three survivors have since died of a recurrence. Both of these patients were operated upon early in our experience in the surgical treatment of such conditions. In both, the surgical resection was too limited. Pneumonectomy would have been a preferable procedure.

Sixteen patients have been treated by pneumonectomy. Six patients died within two months. It is significant that of the survivors, only one has since died of definite metastatic disease. Two of the survivors died in their second postoperative year. An autopsy was performed upon one of these and no trace of malignancy could be found. The remaining seven patients who survived operation are living at the present time with no evidence of recurrence. All of these patients are well and happy and are engaged in the same activities that they pursued preoperatively. Symptoms and signs of respiratory or circulatory embarrassment are lacking. None has an obvious deformity (Fig. 4). At the present time all living patients present no sign of metastatic disease. The survival time in one patient is 5 years, 3 months,



Fig. 4. Patient, 56 years of age, as he appeared four weeks after right pneumonectomy for primary carcinoma of the lung. Note his apparent well-being and general state of nutrition. The wound healed by primary intention. No drainage was used. Note the absence of postoperative deformity.

another 4 years, 10 months, and a third 2 years, 9 months.

CONCLUSIONS

1. Primary carcinoma of the lung is a relatively common disease, accounting for approximately 10 per cent of all cancer deaths.
2. Partial or complete bronchial occlusion, and secondary infection, are the most important pathological processes which are responsible for early symptoms, physical findings, and roentgenological changes.
3. Bronchoscopic examination is by far the most important diagnostic procedure. A persistent unexplained cough, alone or in association with hemoptysis, wheezing, dyspnea, chest discomfort, or other pulmonary symptoms that cannot be definitely accounted for, presents a definite indication for bronchoscopy.
4. Clinical studies made in 70 histologically proven cases are discussed.
5. The diagnosis was made at an operable stage in 22 per cent of the patients in this series.
6. Lobectomy and pneumonectomy are practical therapeutic procedures which at the present time offer definite hope for the patient suffering from primary carcinoma of the lung.

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Lobectomy and Pneumonectomy for Lung Suppuration and Malignancy

A Comprehensive Analysis Including the Authors' Series

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PART I.

IN 1901 Heidenhain performed the first successful lobectomy. During the following years isolated cases of lobes surgically removed were reported occasionally, a great majority of which ended fatally. Up to 1925 there had appeared in the literature approximately 85 cases. Of these, 34 were performed by Lilienthal with a mortality of approximately 60 per cent. The excuse for attempting such a hazardous procedure was the extensive suppurative involvement of the lobes removed and the manifestly permanent disability of the patients subjected to operation. The preoperative toxicity and debilitation of the subjects contributed much to this high mortality. While occasionally chronic lung abscess seems to warrant lobe removal, actually it is the bronchiectasis that has developed incident to the protracted suppuration that renders its excision necessary. Its pathologic importance, therefore, is largely bronchiectatic in nature and will be so considered in this paper. Lobectomy for malignant disease will be discussed under "Pneumonectomy for Carcinoma."

In 1929 Brunn reported six one-stage lobectomies with one death. His unprecedented success at once revived this operation that because of its high mortality had fallen temporarily into disrepute. In 1932 Shenstone and Janes described their tourniquet that permitted lobe excision with surprising facility and comparative safety. Thus was appreciably lowered one of the most difficult barriers to a general application of Brunn's technique. Within the immediately succeeding years a number of lobectomies were reported in the literature. Steadily minor refinements have been added to the operative technique by the various pioneers. Early in this developmental period came the realization that a not inconsiderable proportion among those who died postoperatively were overwhelmed by an extensive suppurative pleuritis. If adhesions were not present the entire lung collapsed during lobectomy. The soiling incident upon the division of the infected bronchi often resulted in an extremely virulent infection of both pleural leaves. Robinson's appeal that "If one lobe can be anchored so that it remains in position during resection of the other lobe or lobes, the chief obstacle to successful lobectomy will be removed" was never more devoutly wished for.

Manifestly the one-stage operation is preferable to the two-stage if the danger of generalized pleuritis can be reduced to a point comparable to that existing in the two-stage procedure.

The two-stage operation is attended with certain very real disadvantages because:

(1) The patient is subjected to two major operations rather than one.

(2) Bronchopneumonia terminating in death has been reported in five cases following the first of a two-stage procedure: Flick 1, Overholt 1, Churchill 1, Dolley and Jones 2. While this disaster might have resulted had the lobe been removed in one stage, yet it appears not unlikely that trauma to the involved lobe and contamination of the bronchi in other lobes because of spill-over from the diseased one, might have been forestalled had the infected lobe been removed primarily.

(3) Occasionally during the first stage, injury occurring to the affected lobe while adhesions binding it to surrounding structures were being separated, lead to the development of a suppurative pleuritis. If the infection proved to be a virulent one and the entire pleural cavity became involved, death usually followed (Dolley and Jones one case). Though the patient survived his empyema, the second stage of a necessity would be indefinitely postponed and when lobe excision finally was attempted, the operation would be rendered immeasurably more difficult by scar tissue binding the lobe intimately to the structures with which it was in contact (Sebestyen, Churchill, Alexander).

Sauerbruch, having regularly experienced disastrous postoperative complications following a one-stage procedure, adopted a multiple-stage technique. The affected lobe was isolated, a rubber tube made to encircle the root and, over several days, gradually tightened until the vessels were finally completely occluded. In the meantime, exclusion of the rest of the hemithorax was accomplished by gauze packs. The technique was difficult and hazardous except under the direction of those particularly trained in its problems.

Alexander then described his two-stage technique. At the first stage, the lobe marked for removal was freed to the hilum. The lobe or lobes remaining were then briskly rubbed with dry gauze not only laterally but on the mediastinal surfaces as well. The parietal pleura was treated in the same manner and the chest wall was closed without drainage. Thus by irritation adhesions developed when the two pleural layers came in contact, so that at the second stage two weeks later the lobe for extirpation could be removed without collapse of the remaining lobe or lobes. The empyema that regularly develops following lobectomy for lung suppuration would by this first stage preparation be largely limited to the space occupied by the lobe excised. At first during the second stage, instead of removing the lobe it was simply ligated close to the hilum in order to deprive it completely of

its blood supply. The chest wall opening was again closed and after sufficient time had elapsed to allow for sloughing, the wound was opened for the third time and the gangrenous mass, the remains of the ligated lobe, was removed. The space, safely limited by the continued adherence of the remaining lobe or lobes, was drained externally.

Very soon there appeared in the literature, however, criticisms of this two-stage procedure because of fatalities following the first stage. Marked pain on coughing following the preliminary operation often made it extremely difficult for the patient to expel pus that had spilled over into the contralateral side from the diseased lobe still draining into the general bronchopulmonary system. The not uncommon development of suppurative bronchopneumonia as a result of this bronchial retention was a strong argument in favor of a one-stage operation despite the fact that the mortality rate from generalized pleuritis following the one-stage had been reported as considerably higher.

Appreciating the increased pneumonia hazard of the two-stage operation as compared with the one-stage, Bethune reported in 1935 his poufrage technique which he believed would reduce very materially the danger of extensive postoperative suppurative pleuritis, the *bete noir* of the one-stage procedure. When lobectomy was decided upon, an artificial pneumothorax was established. If the pleural leaves were so extensively adherent that it was found impossible to introduce air between them, it was felt that the pleural adhesions manifestly present would probably prevent collapse of the uninvolved lobe or lobes during the removal of the affected one and that no further preoperative pleural preparation for the one-stage operation was necessary. If, however, the pleural leaves were free, the lung was partially collapsed by the introduction of air through a needle. Then by means of a thoracoscope inserted through a tiny opening between two ribs, sterile talc was blown under direct vision upon the lobe or lobes that were not to be removed. With the immediate aspiration of the pleural air the lung returned to the chest wall. The irritation of the powder produced adherence. Six or eight weeks later when the thorax was opened for lobectomy, adhesions were usually found sufficiently extensive to permit the removal of the diseased lobe without collapse of the one adjoining it.

In certain clinics—notably, Brunn's, Shenstone and Janes's, Graham's, Edward's, Overholt's, Romanis and Sellar's, O'Brien's and Holst's—the one-stage operation has been consistently followed. Regardless of whether or not the lung is adherent to the chest wall, without attempting to establish adhesions between the visceral and parietal pleurae, the chest is widely opened; the diseased lobe is removed. The hemithorax is rinsed out thoroughly with saline solution and the operative wound is closed completely. Through one or more stab wounds, small tubes are brought out from the thoracic cavity under airtight conditions and immediately constant suction is instituted through them. Within a comparatively few hours the remaining lobe or lobes, because of the negative pressure developed by this suction, are usually to the chest wall and have by compensatory enlargement

actually reduced the space left by the lobe removal. Thus by prompt aspiration of the air remaining after chest wall closure, the suppurative pleuritis which regularly develops is usually limited in extent. Following the modern one-stage technique that has been generally adopted by the protagonists of this procedure, serious pleuritis occurs only uncommonly. Other operators—Alexander, Churchill, Flick, Crimm et al—because of early disastrous experiences from pleuritis following a one-stage lobectomy when the general pleural cavity had become contaminated, followed the Alexander two-stage technique. They limited their cases for one stage to those where there were sufficient adhesions to confine the pleuritis, should it develop, to that region occupied by the lobe which was removed. And still other clinics—Archibald's, Dolley and Jones's, and for the past year Alexander's—have adopted Bethune's precaution of powdering the pleural surface in order to produce adherence to the chest wall of that portion of the lung remaining after lobectomy. In the meantime, the various surgeons even without preoperative attention to pleural adhesions are perfecting themselves in the Brunn-Shenstone-Janes technique. Encouraged by one expedient or another, the surgical trend is now definitely toward the one-stage operation.

DIAGNOSTIC METHODS

It seems redundant to state that the clinical history of the patient applying for treatment for productive cough must be thoroughly obtained. When tuberculosis has been eliminated as a causative agent, there yet remains to be considered the various intrabronchial possibilities that may have produced the existing suppurative process. Bronchoscopy, therefore, becomes of importance not only that the presence or absence of a foreign body, neoplasm or stenosis may be determined but that one may ascertain what lobe-bronchi appear to be involved. It is particularly advisable to repeat this procedure at weekly intervals since not only is the toxicity of the patient lessened following the aspiration of the purulent material accumulated within the dilated bronchi but because often a bronchus apparently not draining at the first bronchoscopy may show pus on a subsequent occasion. By the same token, purulent secretion that has perhaps spilled over into another bronchus during the coughing incident upon the introduction of the bronchoscope, may not appear in this particular bronchus on subsequent examinations. Thus by a series of careful bronchoscopies not only is the general condition of the patient usually improved but a very clear-cut intrabronchial composite picture can be visualized.

Before lobe removal is accomplished, it is a matter of the first importance that the bronchial condition of every lobe be reasonably well known. Unfortunately the majority of patients suffering from bronchiectasis have more than one lobe involved. Often when the lower right lobe is bronchiectatic, the middle lobe too is permanently affected. The lingula of the left upper lobe (considered analogous to the middle lobe on the right) is frequently found to be extensively bronchiectatic in addition to disease in the adjoining lower. It is essen-

tial therefore that the bronchial status of each of these structures be determined before lower lobe excision, that in order to eradicate the disease it may be removed at the same time if disease exists. In fact, following a lower lobe excision, the middle lobe or the lingula, as the case may be, falls into the cardiophrenic sulcus as the lobes above compensatorially expand to obliterate the pleural space thus produced. If it be bronchiectatic, then in the new and lower position the cul-de-sacs cannot empty, puddling increases, and productive sputum persists.

Shenstone seems to have concluded the first bilateral lobectomy (Primrose). Since then Eloesser, Lewis, Churchill, Overholt, Flick, Holst and Alexander have reported cases. The combined removal of both middle and lower lobes is occasionally necessary (Edwards, Churchill, Overholt, Alexander, Dolley and Jones). Because they feel it is uniformly involved, it has become almost the routine procedure with Alexander and Haight to excise the lingula with the left lower lobe (Ehler: personal communication). It is a not infrequent procedure in other clinics (Overholt's, Churchill's, Edwards's, Dolley and Jones's). Overholt and Betts following a partial thoracoplasty for tuberculosis have in four instances removed a lower bronchiectatic lobe on the same side.

It is our custom to introduce lipiodol in one lobe at a time through a Thompson catheter. All injections should be checked by fluoroscope as the lipiodol enters the bronchi, since a strong cough on the part of the patient may render an X-ray film taken a few moments later of little differential diagnostic value. When both the middle and lower lobes are injected with lipiodol at the same time, it is often exceedingly difficult to be sure that bronchial distortions that appear to be present in the upper part of the lower are not actually in the middle lobe. Lateral films are of localizing necessity but are of convincing value only when the oil is limited to one side only since its presence in both lungs makes it impossible to differentiate surely the shadow produced by the lipiodol in the middle lobe from that of the lingula of the left upper lobe. It is most satisfactory, therefore, to inject first the middle lobe bronchus, check by X-ray film in postero-anterior and lateral positions, then delineate the right lower lobe. Following this, the upper lobe bronchi may be injected. After a sufficient time has been allowed to elapse for the elimination of the lipiodol on the right, the left side is treated in a similar manner. Thus one can conclude with a reasonable degree of certainty just what lobes are involved and to what extent.

We feel it is important to postpone operation until the lipiodol has largely disappeared from the lobes of the lung that are not to be resected. Pneumonia developing in one of our cases in a lobe still containing a considerable amount of lipiodol, we felt, might have been avoided had we waited until the bronchi were sufficiently clear of this oil before operating. The purulent material probably aspirated into this lobe following the operation might then have been uneventfully eliminated had its bronchi been free of lipiodol.

PREOPERATIVE PREPARATIONS

In our clinic we have definitely committed ourselves to the one-stage operation. If, when pneumothorax is attempted, no free pleural space is encountered, the lung is found at operation to be sufficiently adherent to the chest wall so that widespread collapse does not take place. If the pleural leaves are not adherent, pneumothorax is established followed by poudrage as previously described. We are convinced this preparatory procedure is of distinct value. It actually accomplishes approximately what the first stage operation does without the danger of the surgery itself and its postoperative hazards.

Beginning usually five days before surgery, the patient is given 90 grains of sulfanilamide up to the day of operation, checking daily the blood concentration level. Since expectoration is usually most profuse in the early morning hours, it is advisable to set the operation comparatively late in the forenoon. If it has been shown during the bronchoscopic period of the patient's preparation for surgery, that a considerable amount of purulent material is uniformly removed by suction during this procedure, then immediately preceding the operation, bronchoscopy is done in order that the dilated bronchi may be as thoroughly emptied of pus as possible.

Preliminary pneumothorax for the purpose of adjusting the patient to a reduction in lung function and to avoid the alleged danger of the sudden increase in intrathoracic pressure incidental to the wide opening of the thorax does not appear justified by actual performance. Even when an entire lung is abruptly clamped off by tourniquet, little or no respiratory change is apparent; with a lobe none at all. While with the sudden collapse of a lung when the chest is opened there is appreciable respiratory difficulty, it is but momentary since the anesthetist, prepared for the change, at once provides additional oxygen and adequately increases the intrapulmonary pressure. It is our opinion shared by other operators (Edwards et al), that the dangers of pneumothorax are not compensated for by any real advantage that can accrue by its preoperative production. Moreover, it effectually precludes that very safeguard which we hold as most desirable: extensive adherence to the chest wall of that portion of the lung that is to remain after lobectomy.

If there is profuse purulent discharge from paranasal sinuses, it is certainly advisable by various conservative measures to see that adequate drainage from these various sinuses be accomplished and maintained. In preparation for lobectomy it is seldom that radical operations on these sinuses are beneficial. Thomas emphasized that while bronchiectasis may occasionally owe its origin to intracranial sinusitis, frequently the two conditions develop synchronously. Hypersensitivity to certain substances manifests itself by hyperemia and edema not only in sinus tracts but in the mucosal lining of bronchi as well. Inadequate drainage leads eventually to inflammatory changes in both regions. While the symptoms of sinusitis appear earlier than those referable to the bronchi, it is none the less probable that the progressive infections in both are allergic in origin rather than that the one is secondary to the other. It is clearly desirable

that the particular things to which a given patient is sensitive should be identified and eliminated, that bronchiectatic progression may be halted. However, it is not essential that this problem be solved before lobectomy.

ANESTHESIA

The question of the anesthesia and the anesthetist is of vital importance in major intrathoracic surgery. J. G. Dunlop or C. F. McCuskey has for several years conducted the anesthetics for our more serious cases. Before the time of operation is decided upon, we assure ourselves that we can obtain the services of one of them. The importance of an anesthetist trained in the multitudinous and complicated intricacies of intrathoracic surgery is not easily overestimated. Intratracheal anesthesia is employed almost universally now during single or multiple lobe removals. A clear air-way is assured at all times and intratracheal suction can be carried out at will. The patient is maintained in a moderate Trendelenburg position so that purulent secretions escaping from the involved lobe gravitate toward the corina where the suction tube removes them.

The choice of anesthetic has varied considerably. Edwards, Shenstone and Janes, Lewis and Magill have employed high spinal anesthesia. Respirations, they report, are usually quiet. If cough produces anoxemia, oxygen is readily supplied by a tight-fitting mask. They feel the operative risk is lessened and the surgical procedure itself is attended with less shock. Burnett found local anesthesia with nerve block entirely satisfactory. Peridural anesthesia (Pieri) and avertin have their advocates (Rienhoff, Flick and Gibbon). Ether has been used without unfavorable results attributed to it (Sauerbruch, Nissen, Lilienthal, Roberts, Lyle). Santy, Bonniot, Corajod, Berard and Mason used chloroform without untoward effect. Nitrous oxide and oxygen is used routinely by a number of men (Archibald, Rienhoff, Flick, Duval and Monod, et al). The chief criticism of this anesthetic is the great difficulty the anesthetists encounter in maintaining adequate oxygenation. Patients with chronic pulmonary suppurative disease do not well tolerate anoxemia. Marked and sudden changes in intrathoracic pressures, mediastinal pendulation, paradoxical lung movement and open bronchi all demand a high percentage of oxygen in the inspired air to compensate for temporarily reduced vital capacity. An anesthetic that would permit the administration of a high percentage of oxygen is therefore particularly desirable. Cyclopropane seems to be most nearly ideal for with it 80 or even 90 per cent oxygen can be supplied and yet maintain the patient in complete relaxation (Churchill, Graham, Crafoord, Overholt, Dolley and Jones).

OPERATIVE TECHNIQUE

1. *Chest Wall Incision.*

It is essential that the opening in the chest wall meet two requirements: (a) that it be large enough to allow ample room for the surgical procedures necessary, (b) that the exposure be directly over that portion of the lung that is to be removed and at the same time widely expose the lobe hilum.

It is generally agreed that for lower lobe exposure a posterolateral incision is best. The incision is begun just lateral to the transverse process of the fourth or fifth rib downward to the seventh rib or interspace and outward along this rib to the anterior axillary line. The sixth rib may be excised throughout the extent of the wound (Sellors) or the seventh (Alexander) or both the seventh and eighth (Churchill). Often no ribs are removed (Edwards, Holst, Flick, O'Brien, Graham, Dolley and Jones). It is then advantageous to divide posteriorly the ribs immediately above and below the interspace through which entrance into the pleural space is accomplished. Retraction against these divided ribs affords an excellent view of the lower lobe and hilum. Small sections of these divided ribs are removed, that postoperatively rubbing together of these cut ends may not occur.

The anterolateral incision along the fifth interspace very satisfactorily exposes the upper and middle lobes, though a transverse incision over the third interspace offers excellent exposure to these lobes (Rienhoff). The great advantages of the intercostal incisions over extensive rib resection are: (1) the integrity of the chest wall is retained so that with pain controlled by narcotics, coughing efficiency is not seriously decreased; (2) no deformity is produced. In women the anterolateral incision may be along the submammary fold and thus is largely concealed.

2. *Disposal of the Lobe Stump.*

In suppurative conditions of the lung, the lobe even at the hilum is usually thickened by scar tissue and inflammatory edema. Separate ligation of the vessels without primary application of a tourniquet is hazardous or impossible. Nor is it necessary to resect a bronchiectatic lobe flush with the hilum. The contraction of the scar tissue in a reasonably short stump soon eliminates all inflammation remaining. The original Brunn-Shenstone-Janes technique has not varied in this regard. As soon as a satisfactory stump has been developed, a tourniquet is slipped over the lobe to be removed and tightened sufficiently to occlude both the arteries and the bronchus. The closure of the bronchus prevents any further possibility of soiling the remaining lung lobes.

The actual disposal of the stump after the application of the tourniquet is one of the most important phases of lobectomy. Hemorrhage, early development of a bronchial leak followed perhaps by widespread suppurative pleuritis, and aspiration of infected pleural fluid into remaining lobes may be particularly untoward complications following an insecure stump closure. It is clearly advantageous to be able to cover the stump smoothly with visceral pleura. This is usually without great difficulty accomplished in two ways: (1) A circular incision is made about the lung some distance from the tourniquet deep enough to include the visceral pleura and approximately two or three millimeters of the lung tissue. This is dissected toward the hilum until a cuff some centimeter wide is formed. Circular amputation is continued beginning about two centimeters from the tourniquet, gradually cutting closer and closer toward the tourniquet until as the very center of the stump is

approached the cone point of this funnel-shaped depression is approximately a centimeter from the tourniquet. Vessels are ligated separately with chromic No. 2. Bronchi are dissected up close to the tourniquet and snugly ligated or purse-stringed with silk. The tourniquet is then slowly loosened. If bleeding points appear they are clamped and ligated. The cone-shaped walls are approximated with chromic No. 2 and finally the pleural cuff is closed tightly over the stump with chromic No. 1 running suture so that no raw surfaces are exposed. The bronchi are deeply buried. When this technique can be carried out, there is little likelihood of hemorrhage. The development of a bronchial fistula is the exception, not the rule. Not uncommonly, however, either a well-formed lobe root cannot be cleared or the tissues are so matted together by inflammation and indurated tissue that individual treatment of the various structures is not possible, then (2) A cone-shaped excision of the lobe is done, cutting from one side of the lobe a thin tongue-shaped flap with its base continuous with the stump to be used at the end of stump treatment. A series of figure-of-eight sutures close the vessels en masse, gradually drawing the walls of the stump closer together. The tourniquet is loosened, bleeding vessels remaining are controlled by additional sutures and the tourniquet removed. The tongue-shaped pleural flap previously provided is placed across the suture line and sutured snugly across it. It usually is not possible to bury deeply the cut bronchi in this type of stump. Bronchopleural fistulae frequently develop. It is seldom, however, that the fistula produces serious pleuritis since several days usually elapse before bronchial opening occurs. Compensatory expansion of the lobe or lobes remaining in the hemithorax after lobectomy, has by that time so reduced the residual free pleural space as to make this complication of little moment. Almost without exception these fistulae close spontaneously.

3. Closure of the Wound and Drainage.

Drainage is established in every case invariably under airtight conditions. Despite all precautions some contamination of the pleural walls takes place. Uniformly the serum escaping into the pleural space becomes infected. With immediately established tube suction, not only is this material aspirated as it forms but by virtue of the negative pressure that is maintained by this continuous suction the lobe or lobes remaining within 24 hours (O'Brien) enlarge sufficiently nearly to obliterate the space left by lobe removal. Through a stab wound between two ribs somewhat above the diaphragm one catheter (often Pezzar type) is placed at the posterior axillary or midscapular line. It is our custom to place another at the mammary or anterior axillary line in order to aspirate the air collecting anteriorly that would otherwise be trapped until absorption removed it. (O'Brien inserts three drains, one to the stump from the posterior axillary line, a second in axilla, and a third anteriorly). The anterior drain is removed in one to three days. The posterior one leading toward the stump where a collection of pus is prone to develop (Churchill) is left in place for two to three weeks, depending upon the amount and character of the drainage. Occasionally in

order to make the drainage opening more adequate, a short section of rib is removed at the site of the intercostal drainage and a larger tube inserted into the residual empyemal pocket that necessitated the procedure. Closed drainage, of course, is continued until the lung limiting this small residual pocket is firmly adherent.

The ribs separated by the intercostal incision are usually approximated by pericostal sutures of twenty-day chromic. A very convenient and rapid method of securely holding the ribs together without danger of including an intercostal nerve in the approximating stitch is to make holes through the adjoining ribs at regular intervals with a harnessmaker's leather punch (Dolley and Jones).

POSTOPERATIVE CARE

Before the intratracheal tube is removed, a final thorough cleansing of the trachea by suction is done. Five per cent glucose in normal saline solution is slowly administered intravenously throughout the operation. This is continued when the patient is returned to his room, substituting whole blood if it seems desirable to do so. Usually a total of 2000 cc. of fluid is thus given over a period of four to six hours. Every precaution is taken to avert atelectasis: carbon dioxide inhalations every three hours, frequent changes in position. Coughing is insisted upon not only to clear the airways but as an aid to eliminating any infectious material that may be retained. It is particularly important that the patient be given narcotics in sufficient amounts to control pain, for it is the opinion of the writers that cough and deep inspirations cannot be adequately accomplished if severe respiratory pain exists. Long-continued post-traumatic or postoperative shallow respiration is one of the most portentous factors in the production of inspissated mucus, bronchial plugs, atelectasis and bronchopneumonitis.

Immediately upon return from surgery, the drain or drains that have been clamped closed are connected by additional tubing to an electric or water suction apparatus. Constant low aspirating suction is maintained. The negative pressure thus produced not only removes fluid as it forms and the air imprisoned upon chest wall closure but also rapidly reduces the size of the space created by lobe removal by sucking the lung toward the chest wall. The anterior tube is removed in 48 to 72 hours. The posterior drain is left in place indefinitely. If the remaining lung by compensatory dilatation early obliterates the pleural space and suction drainage is slight, the tube may be removed within ten days. Usually in three weeks the area of pleuritis has shrunk down snugly about the tube so that it can be safely taken out.

CONSIDERATION OF CASES COLLECTED FROM LITERATURE

Table I is a compilation of all lobectomies available in the literature. It includes both those collected by Meyer before 1912 and Lilienthal's pioneering series up to 1925. Since the appearance of Brunn's paper in 1929 there has been a steady and definitely encouraging reduction in the mortality rate. To 1929 there was recorded

TABLE I
Lobectomy for Bronchiectasis

Surgeon	No. Cases	No. Op. Stages	Cured	Imp.	Deaths
Archibald	13	1			3
Alexander et al	25	2			5
Bettman	1	1			1
Brunn	8	1			2
Churchill	47	1-2	30	14	3
Coryllos	7	2	5		2
Coryn and Clerens	1	2		1	
Crimm	1	2	1		
Denk	5	2	1	3	1
Dolley and Jones	31	2-1	20	5	6
Edwards	48	1	24	17	7
Flick	18	1-2	9	3	5
Graham	27	2 1			5 total stated
Guibal	6	2	1		5
Hansen	4		3		1
Harrington	7	2	2	3	2
Head	1	1	1		
Heðblom	4	2	2		2
Hitzrot	1		1		
Holst	10	1	7	3	0
Kinsella	4	1	3	1	
Kirschner	1	2		1	
Lilienthal	42	2	10	4	27
Meyer W.	1	2		1	
Meyer collected	16	2	8		8
Monod	1	1	1		
Nissen	1	2	1		
O'Brien	15	1			
Ostrowski and Bross	2	1	2		
Overholt	17	1			1
Pieri	1	1		1	
de Quervain	1	2	1		
Roberts	10	1			2

TABLE I—Continued
Lobectomy for Bronchiectasis

Surgeon	No. Cases	No. Op. Stages	Cured	Imp.	Deaths
Robinson	7	2	4		3
Romanis and Sellors	46	1	23	12	11 total stated
Sauerbruch and Nissen	47	2			6
Sebestyen	21	3 1-3	8	7	6 total stated
Shenstone and Janes	38	1	16	8	10
Whittemore	12	1	7	2	3
Zaaijer	1	2	1		
39	549	172	86	127 = 23%	

164 condition not stated
16 operators employed 1 stage
16 operators employed 2 stage
8 operators employed 1 and 2 stage

in the best of hands an average death rate from lobectomy of nearly 60 per cent. A grand mean for the total of 549 recorded in Table I, which includes all cases from the earliest ones to date, is 23+ per cent.

Graham, Singer and Ballou in their exhaustive work on *The Surgical Diseases of the Chest*, published in 1935, gathered from the literature reports on 218 lobectomies. This series represented the collected results of 25 contributors. Of the 218 cases, roughly 75 per cent were conducted in two or more stages. The combined death rate, regardless of the type of operation, was 34 per cent. There were 99 apparently cured. The authors concluded that "a patient with bronchiectasis submitting to lobectomy runs about a 15 to 20 per cent risk of dying because of the operation, and that if he recovers from the operation he has only about a 65 per cent chance of having a thoroughly satisfactory result." They concurred with the general opinion of that time, scarcely four years ago, that the operation still remained "one of the most serious procedures in the surgical repertory." Yet this dictum so clearly true four years ago, now, because of refinements in surgical technique and pre-operative and postoperative care that have steadily developed, is no longer applicable. When only those operations from 1929 are considered, the proportion ending fatally is reduced to 18+ per cent. The results in individual series during the past three years, however, have cut even this mortality rate nearly or quite in half. Churchill by methods above described has had one death in 38 patients—2.6 per cent. Of the last 50, none has died. O'Brien had one death in 15 patients—6+ per cent. Overholt in his last 17 cases had one death—

6 per cent. Graham in the last 15 cases had no deaths. Dolley and Jones in their last 17 had two fatalities—11 per cent.

It seems astounding that an operation of the apparent magnitude of lobectomy should be attended with approximately a 10 per cent mortality rate when one calls to mind that the mortality rates for appendicectomy and cholecystectomy are roughly 6 and 8 per cent respectively, and especially when one considers that in particular clinics which total less than fifty cases one or two deaths more or less, materially affect mortality percentages. It is all the more impressive when one takes into consideration that a pulmonary lobe is seldom removed except to relieve a patient who without operation would be permanently disabled, since it is in most instances an operation of necessity rather than of election.

Thus by the combined use of repeated bronchoscopies and serial lobar lipiodol injections the extent of the bron-

chiectasis and the number of lobes involved can be satisfactorily determined. Before the mortality of lobectomy was reduced to its present low level, bilateral disease automatically precluded operative removal of the lobes involved. At the present time, however, not only is it possible with a reasonable degree of safety to remove both lower lobes but any one of several combinations. If one lung is clear and the entire lung on the opposite side is extensively involved, pneumonectomy is permissible and often advisable. If the middle lobe is involved with the lower, these two with a reasonable degree of safety can be removed at the same time. And so too on the left, the lingula can be excised together with the lower lobe. It is, therefore, only when the upper lobes too are involved that the possibility of removal of the diseased lobes is completely excluded.

(PART II will appear in the June issue of THE JOURNAL-LANCET.)

Eighth Annual Report of the Tuberculosis Committee, American Student Health Association For the Year 1937-38*

ONE of the most determined and significant assaults being made upon tuberculosis is the battle against the disease now in progress among the college students of the country. The Tuberculosis Committee of the American Student Health Association is able to recount the success of many institutions of higher education in their attempts to achieve early diagnosis and adequate care for student cases of tuberculosis. Since the last Annual Report was presented, advances have been made along almost every salient of the embattled front against an ancient and deadly foe of youth and civilization. It becomes our duty, however, not only to record the signal victories that have been won, but also to indicate most strongly the enhanced effectiveness of a campaign that could be prosecuted if all colleges enlisted in the ranks of the army of better health. In a fight to the finish we have greater need of combatants and reinforcements than we have for those who qualify merely as interested spectators or readers of front line dispatches.

This Eighth Annual Report is concerned largely with the results of a continuing survey of tuberculosis among American college students. It recounts one more chapter in the story related by seven previous inventories of the problem and its solution. The appraisal, completed in December, 1938, was accomplished by means of a questionnaire sent out to over 850 of the more important institutions of higher learning in this country, regardless

*Presented at the nineteenth annual meeting, Hotel New Yorker, New York City, N. Y., December 29-30, 1938.

of whether or not they maintain membership in the national Student Health organization. Upwards of 150 colleges are already members of the American Student Health Association.

This is the most extensive and ambitious check-up since the Tuberculosis Committee was originally appointed following the First National Conference on College Hygiene, gathered at Syracuse, N. Y., in 1931. As was the case last year, the summary represents the combined effort of the Committee chairman and the statistical staff of the National Tuberculosis Association, with the other members of either group providing constant support through advice and coöperation. To Dr. Kendall Emerson and his associates in the Tuberculosis Association we again acknowledge a debt of gratitude we can never hope to liquidate, while to the scattered membership of the Committee the chairman owes much for suggestion, direction and constructive criticism of former Reports. Finally, to all who have contributed time and thought to the preparation of the factual replies that have made this collection of data possible, we extend the thanks, not only of the Committee and the Association, but also of those college Health Officers who in the future may be aided in planning or improving a program of tuberculosis control in a growing roster of institutions throughout the United States and Canada.

This year the questionnaire we shall refer to as "routine" was simplified and clarified. As a direct result, the information conveyed to headquarters is fuller than ever

before, and more satisfactory, both statistically and clinically, than previously received. Prepared prior to last summer, the forms were mimeographed and ready for mailing by the date when schools reopened this fall. They were dispatched from National Tuberculosis headquarters in New York City, accompanied by a circular letter requesting their return not later than November 1st. It was encouraging and helpful that so large a number of schools met this reasonable dead-line, though, as usual, a few replies, all of them important, continued to trickle in up until the week before Christmas. Annually, a handful of interesting questionnaires misses inclusion in the Report because, received so late, it would mean tearing the text and tables limb from limb were an attempt made to add the tardy statistics.

The prompt response this fall may be credited in part to the earlier date of circularizing the colleges, in part to the fact that an addressed return envelope, needing no postage, was enclosed. It is also probable that each autumn finds more schools prepared to cooperate in the annual survey of case-finding methods and results, as well as each institution being better provided with reliable facts and figures.

An innovation this year was the mailing of duplicate blanks, in order that one copy might be available to the Student Health director for retention in his tuberculosis file. Armed with this, and reassured by the Committee that no significant or gross changes in the blank are contemplated in the near future, the physician or other officer making the return should be better able to anticipate the scope of the data we hope may be forthcoming in succeeding polls.

For two years, in addition to the routine questionnaire, a more detailed blank has been sent out. Last year this went to but a few carefully selected colleges and universities—those known to be supporting a truly complete tuberculosis case-finding set-up. In 1938 the blank was much simplified, and was sent to all schools, asking merely that as many of the questions be answered as possible or convenient. A quite gratifying response was elicited from a certain minority of institutions, and the facts so accumulated are of distinct value. For the present, however, it is evident that the vast majority of colleges cannot hope to provide us with such detailed statistics. Accordingly, we plan to discontinue use of the more elaborate form in our annual contact with most schools. We trust that those who have already shown a disposition or an ability to assist us with the more advanced study will be willing to continue their aid in the future. We sincerely hope, however, that the decision to limit the use of the Special Questionnaire may not tempt Health Services to remain content with what must, in some places, be sketchy and incomplete records. Leadership must be toward a flexible, sensible, efficient system of tuberculosis record and follow-up. Until this has been developed it seems futile and inconsiderate for us to spend time and money in pestering busy executives for information they are not equipped to supply.

The first item of the three-fold program of the Tuberculosis Committee has to do with the formulation of

a suitable program for tuberculosis case-finding and control among college students. The program must be fitted to the needs and the resources of the given college. Accordingly, a very workable, yet easily adjustable outline has been adopted as the result of repeated conferences at the annual meetings of the Association and based on the diversified experience of many Health Services and tuberculosis agencies. To those who are not yet acquainted with the recommendations of the Committee, we would suggest a study of the material contained in the section on "Tuberculosis" in the Proceedings of the Second National Conference on College Hygiene, Washington, D. C., 1936. All members of the Committee are anxious to be called upon at any time when they may be of service in answering questions that may arise with respect to the inauguration or revamping of a case-finding program. National, State and local Tuberculosis Associations have proved willing and able to assist with the planning of a campaign in colleges the country over. All that interested colleges need display is a desire for information or help toward the laying of a proper foundation for a system of modern tuberculosis control. Thereafter the combined support of every available agency will be theirs to command. It must be reiterated, however, that the need must be brought to the attention of those who are equipped to give the advice and render the aid.

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As its second objective the Tuberculosis Committee aims at stimulating interest among the sectional divisions of the American Student Health Association. Each year the scattered sectional meetings are encouraged to schedule at least one paper or round table discussion on various phases of student tuberculosis. The past year has been no exception, and we are glad to be able to report a considerable number of such activities, too extensive to list here. As a result of such regional efforts there have come many enquiries to the Committee from those in attendance at sectional conferences, anxious to secure further information about college tuberculosis programs. We believe the section meetings are the logical starting points for interest of this sort, since problems common to the given district best find opportunity for thorough discussion. Experience gained by years of observation in California may be of great value to a worker situated in a New England college. It is highly probable, however, that sister institutions in New England have accumulated information that will be more applicable locally. We should like to call the attention of regional executives to the recommendation made by the Committee last year, that a special representative be appointed in each section to be responsible for the portion of the meeting devoted to tuberculosis, to act in an advisory and consultative capacity with schools in that locality and to cooperate with the national Committee. So far only one or two section chairmen have notified us of such appointments.

Following its custom, the Committee sponsored the 5th annual College Hygiene luncheon during the 34th annual meeting of the National Tuberculosis Association, held in the Biltmore Hotel, Los Angeles, Califor-

nia, June 22, 1938. Considering that the meeting was held so far from the geographical center of college concentration, the attendance was splendid. About 75 delegates, drawn in most part from institutions seldom represented at our national meetings, heard a thoughtful and stimulating address by Dr. Kendall Emerson, managing director of the National Tuberculosis Association. In his paper Dr. Emerson stressed the importance of a side of our work we are sometimes too apt to take for granted, namely, student interest and cooperation in the college's efforts at tuberculosis control.

In the *Bulletin of the Association of American Colleges* for May, 1938, appeared an article written by Dr. J. A. Myers, of Minnesota, a member of our Committee, and, at that time, President of the National Tuberculosis Association, entitled, "The Importance of the Early Discovery of Tuberculosis Among College Students." It is our hope that this article succeeded, as was intended, in placing a most urgent health obligation before many of those college administrators who are never reached by our Student Health meetings, never read our medical publications, remain unimpressed by "campaign literature." Negotiations are still proceeding toward arranging for a session at one of the forthcoming meetings of the college presidents' organization to be devoted to a consideration of student health matters, and to tuberculosis in particular. We believe that a personal appeal promises to carry more weight with this busy group of laymen than endless written communications can ever do.

This year, for the first time, we have been able to prepare a preliminary draft of the high points of this Report, ready for distribution at the annual meeting. While far from complete, it serves as something tangible for delegates to take away with them, and should help to bridge the long gap between the presentation of the Report upon the floor of the meeting and the date of its appearance in print, months later. We are indebted to the National Tuberculosis Association for the cost and work connected with the mimeographing of this bulletin.

Incorporated in the preliminary report mentioned is a fairly complete reference list of recent publications dealing with the matter of student age tuberculosis. If space permits, the list will be found appended to the present Report. We shall endeavor to keep extant a fairly accurate bibliography of pertinent articles and would greatly appreciate hearing of any that have escaped inclusion. We are particularly desirous of receiving reprints from authors.

Although the collection of statistics and facts concerning work that has been accomplished may appeal to some as being not nearly so vital as concentration on action proceeding at the moment or plans being made for the future, it is nevertheless true that upon the successes of the past and with due cognizance of the mistakes made we normally base our preparations for predictable future problems. The third part of the Tuberculosis Committee's work, accordingly, has always been the collection of annual statistics on tuberculin testing, X-raying and other scrutiny of college students, and as

TABLE I.
Questionnaire Survey of Tuberculosis Case-Finding in
American Colleges and Universities, 1937-38.

	Blanks Sent	Replies Received	TB Programs Reported
Canada	1	1	1
Total	1	1	1
Maine	7	1	0
New Hampshire	5	0	0
Vermont	6	1	1
Massachusetts	40	9	7
Rhode Island	4	1	1
Connecticut	12	6	3
Total	74	18	12
New York	51	19	14
Pennsylvania	68	17	11
New Jersey	18	5	5
Delaware	1	0	0
Maryland	18	4	1
District of Columbia	9	1	1
Total	165	46	32
Virginia	19	5	1
North Carolina	22	6	2
South Carolina	16	2	1
Georgia	15	2	2
Florida	7	1	1
Total	79	16	7
Oklahoma	16	6	1
Arkansas	11	1	1
Tennessee	26	3	0
Mississippi	10	1	0
Alabama	13	4	2
Louisiana	11	1	0
Texas	33	5	1
Total	120	21	5
North Dakota	9	2	1
South Dakota	8	0	0
Minnesota	21	10	10
Wisconsin	23	12	10
Michigan	25	3	3
Ohio	47	17	7
West Virginia	15	6	3
Indiana	25	6	4
Illinois	43	15	4
Iowa	25	7	2
Nebraska	17	4	1
Kansas	21	9	3
Missouri	25	7	3
Kentucky	15	2	2
Total	319	100	53
Montana	6	2	2
Idaho	8	1	1
Wyoming	1	1	0
Nevada	1	0	0
Utah	4	3	2
Colorado	9	4	2
Arizona	3	1	0
New Mexico	4	3	2
Total	36	15	9
Washington	13	4	3
Oregon	11	5	3
California	34	12	8
Total	58	21	14
Grand Total	852	238	133
Previous Year	819	233	104

to the incidence of tuberculosis in that section of American youth.

We have already outlined the manner in which these data were assembled during the autumn of 1938, dealing with the results accomplished throughout the academic year ending in June of the same year. Let us now proceed to an examination of the facts adduced and a consideration of some of the lessons they teach.

It will be noticed, first of all, (Table I), that we communicated with a somewhat larger number of colleges and universities than was the case a year ago. Our list was made as fully representative as possible. As a result we received replies from a scattered few schools not previously among our correspondents. On the whole, however, the colleges taking part in the tuberculosis survey for 1937-38 were virtually the same ones responding the preceding year (Table II).

Two encouraging facts emerge from behind the bare totals presented in Table I. The first is the sharp increase in the number of colleges able to report them-

TABLE II
Enrollment of Institutions Cooperating in Tuberculosis Survey.

Enrollment	Number of Schools	
	1936-37	1937-38
Less than 500 students	78	78
500 to 999 students	66	52
1,000 to 1,999 students	37	40
2,000 to 2,999 students	12	15
3,000 to 3,999 students	4	10
4,000 to 4,999 students	8	5
5,000 students and over	20	19
Enrollment not given	8	19
Total student enrollment, 1937-38		386,101
No. students reported eligible for Health Service		275,448

selves possessors of case-finding programs. Last year our summary showed 104 in that category, while only a year later the figure has grown to 133, a rise of 27.8 per cent. This also means that the percentage of schools on our mailing list now sponsoring tuberculosis work has climbed to 15.6 per cent. Although this latter figure leaves much to be desired and a great amount of work to be done, the favorable shift in the direction of progress is heartening, as is the further circumstances of 31 colleges still listed in the negative column for 1937-38, but either already embarked on a program or planning to start one in the very near future. There can be no doubt that an enthusiastic response is becoming increasingly evident throughout most of the country. That certain areas remain consistently slow to take up the challenge may indicate the presence of more than ordinary local difficulties to be overcome. Usually it points to the relative dearth of organized student health facilities. Whatever the reason, it clearly calls on us for more effort to be directed where it is most needed, and to the need for a strengthening of the sectional structure of the American Student Health Association at those points.

Apart from the geographical analysis of the 1937-38 returns into states and regions, it is interesting to note (Table II) that the replies emanated from every size of institution. Far from being confined to large universities, tuberculosis control among students is being carried on most frequently in the small and medium sized colleges. Indeed, it is usually in the schools with large enrollments that we find tuberculin testing or other diagnostic measures limited to relatively small groups of students—those exposed to special hazards of infection by the nature of their course work. By and large, it must be admitted that the smaller schools have swung into line with the pioneers in this preventive project most enthusiastically, and in individual small colleges with well developed health services the coverage of students is apt to be gratifyingly complete, once the program has passed through its "growing up" stage.

In Table III we have attempted to classify the cooperating institutions according to general type and to presence or absence of a program.

The employment of the Mantoux intradermal technique by schools reporting tuberculin testing seems almost unanimous. At least we can justly claim that the Von Pirquet technique has practically dropped out of sight in the replies we receive annually (Table IV). A few inquiries have reached us concerning various forms of the "patch test" technique. One university, we know, is already giving this method a thorough and controlled

TABLE III.
Tuberculosis Case-Finding as Reported in Various Classes of Institutions of Higher Education.

Type of School	Schools with	Schools with
	NO TB. Program 1937-38	SOME TB. Program 1937-38
Private Endowed Colleges	64	41
Endowed Universities	10	14
State Universities	7	19
State Colleges and Institutes	5	18
State Normal and Teacher's Colleges	16	38
Civic Colleges and Universities	3	3
Total Replying	105	133

trial on a fraction of its tested students. Our answer to those who have sought the Committee's opinion of the patch test is that we are constantly striving to discover any way of simplifying means for discovering tuberculosis early, provided that we can be sure we are strengthening our routine coincidentally. We feel that the patch test is still too much of an unknown quantity for us to pass fair judgment. Certainly we would be loath to advise its widespread adoption as the method of choice until more is known about its relative effectiveness when compared with the intradermal method. We feel that this is an interesting piece of research that any college can easily carry on, testing a portion of its students with the older method, another portion with the patch test, and a third group with both, the whole experiment to be followed up with exceedingly careful X-ray studies of all three groups. For students who might not otherwise be tested, due to personal or parental dislike for the testing needle, the patch test certainly offers a reasonable compromise. Before its adoption for a whole student body, however, some of its admitted disadvantages should be realized. First, a few individuals are known to react violently to certain components of adhesive tape. In them the cutaneous test is spoiled by the nearby allergic manifestation. Second, in athletes or those who perspire heavily the tuberculin may be diluted by perspiration. Third, the patch may come off prematurely, as in the shower bath, or it may be removed or displaced by an inquisitive individual. Finally, unlike the Mantoux test, in which we can be sure we have introduced a measured dose of tuberculin into the skin layers, the patch test can promise, at best, an uncertain accuracy of dosage, especially if the product has deteriorated at all between the time of manufacture and the date of testing. There is nothing really new about the patch test. It is merely a modern adaptation of the old, now unused Moro test.

The type of tuberculin used shows a continued growth in the popularity of the Purified Protein Derivative, although a considerable number of colleges still test with Old Tuberculin. In its publications, the Tuberculosis Committee has recommended the general adoption of P. P. D. as the testing material of choice, but has never questioned the utility and dependability of *reliably standardized* preparations of O. T. It has appeared, from the results of several investigators, that P. P. D. promises more in the way of uniformity, that it is somewhat more delicately diagnostic, that it is less liable to produce non-specific false positives. From the standpoint of evaluating results annually, if for no other

TABLE IV.
Details of Tuberculin Testing Routine in Various Institutions.

	1936-37	1937-38
Number of Colleges Reporting Some Tuberculin Testing in Progress	91	116
Method Employed:		
Mantoux Intradermal Technique	80	109
Not Specified	11	7
Type of Tuberculin Used:		
Purified Protein Derivative	47	63
Old Tuberculin	40	46
Not Specified	4	7
Number and Strength of Test Doses:		
P. P. D. up to 0.005 mg., or O. T. up to 1.0 mg.	42*	82*
P. P. D. not over 0.00002 mg., or O. T. not over 0.1 mg.	44*	28*
Not Specified	6	7
Groups Subjected to Test:		
Students:		
New Students only	42	33
Annual Re-test for Negative Reactors	17	44
New Students, with Re-test for Seniors		6
Any Student, Entirely Voluntary	8	18
First Test Required, Subsequent Tests Voluntary		4
Special Hazards Groups only	24	4
Not Specified		7
Non-Students:		
College Food Handlers (Required)	30	48
Faculty, Clerks, Other Employees (Mostly Voluntary)	29	38

*One school has been experimenting with either method on parallel groups.

reason, the Committee would like to encounter a uniformity of procedure over the nation, but against this is, and apparently for some time will be, the very practical consideration of cost. The price of P. P. D. has been much reduced since it first was made available commercially, but it is still too expensive for many colleges where the health budget is small, or where testing of only a few students at a time is practiced. The extreme variability of potency of various batches and brands of O. T. should be borne in mind constantly, however, by those using it. For instance, one school whose positive reactors have for years run at the 25 per cent level, wrote us this year in perplexity because the figure had unexplainedly dropped to 7.5 per cent, although they were again using O. T. supplied by the local Tuberculosis Association, the tests being performed by the same physician as in past years. The disappointment arising from such an experience, the trouble and expense of re-testing (were it attempted), and the inevitable question mark automatically conjured up in the minds of the tested, are important considerations, but much more to be regarded is the danger of accepting as "negative" reactors all those who failed to react to what was obviously a poor preparation of O. T. If the older product is to be used, as it may be very safely, we cannot urge too strongly that a product of known potency be selected. The O. T. available from the Saranac Laboratories, Saranac Lake, N. Y., has long been noted as fulfilling the requirements of a reliable diagnostic agent.

Gratifying indeed is the greatly increased number of institutions that can be included this year in the group employing what we shall term an adequate dosage of tuberculin. We believe it is now generally accepted that in testing apparently healthy adults, a dose of P. P. D. of at least 0.005 mg., or of O. T. of at least 1.0 mg. should be reached before a diagnosis of "negative reactor" is allowable. A year ago 42 schools could claim to meet this minimum requirement. In 1937-38 the

TABLE V.
Contrasting Results of Using Smaller or Larger Dosage of Tuberculin in Testing College Students, 1937-38.‡

	No. of Colleges	No. of Students Tested	No. of Students Positive	Pct. Positive
I. Dosage reached at least 0.005 mg. of P. P. D. or 1.0 mg. of O. T.	82§	47,879	13,856	28.9
II. Dosage did not exceed 0.00002 mg. of P. P. D. or 0.1 mg. of O. T.	28§	13,157	2,037	15.5

‡It must be remembered that these were students at different institutions, but the distribution over the country was fairly uniform.

§One school appears in both groups (see Table IV).

number had increased to 82. Schools where the physicians are content to base their program on a follow-up of the positive reactors discovered by testing with more minute doses of tuberculin have dropped from 44 to 28. The same university which last year reported testing one-half its new students with the standard two-dose P. P. D. technique (30.6 per cent positive), and the other half with the primary small dose only (17.7 per cent positive), has gone ahead with the study, and for 1937-38 reports positive reactors as startlingly at variance as before. In Table V will be found further proof of the contention that a single small dose fails to find sufficient of the positives to make it a procedure safely to be recommended. Here we see that 47,849 students, tested in 82 colleges with either the standard two-dose routine or (in a very few) with a single large dose, disclosed 28.9 per cent positive reactors, while in 28 other schools, where 13,157 individuals were given a single small dose, the positives proved to be only 15.5 per cent. We fully realize that we are comparing results on differing student bodies, interpreted by different examiners, and therefore we do not advance these figures as exact computations. Rather, we claim, as we did a year ago, when the ratio was 30.5 per cent to 22.7 per cent, that there is ample evidence, at least, to support an unhesitating recommendation for adequate dosage. That is as far as it is safe or fair to make use of the figures mentioned.

One word of caution should be forthcoming at this point. We have previously pointed out that most investigators believe the degree of allergy, that is, the number of "pluses" the reaction happens to be, is an unreliable index of what subsequent X-ray and clinical examination may be expected to reveal. One or two schools, however, report using the strength of the tuberculin reaction as one of the criteria they respect in deciding whether to X-ray or otherwise follow up a positive reactor. We can recall a long series of "negative chests" in individuals with two, three, or even four-plus tuberculin reactions, as well as plenty of suspicious and definitely involved lungs shown by X-ray and other scrutiny of those with no more than a one-plus skin test.

Table IV bears other cheering news in that we find a rapidly growing tendency among the colleges to provide repeated tests for previously negative reactors. Only 33 schools now report a test at entrance to college, followed by no further attempt to re-test negatives. On the other hand, 44 institutions re-test annually, 6 re-test their seniors, 18 offer tests and re-tests to any interested student, 4 provide voluntary re-testing following a required first

TABLE VI.
Details of Chest X-Ray Procedures at Various Institutions

	1936-37	1937-38
I. Schools with Tuberculin Testing:		
X-ray Positive Reactors Once, with Follow-up "When Indicated"	51	62
X-ray Positive Reactors Annually or Oftener	18	31
X-ray Once; Re-ray Seniors		3
X-ray is Voluntary, Acceptance General	5	13
X-ray is Voluntary, Acceptance Poor	13	1
Not Specified	4	1
Fluoroscope, Used Exclusively, Film only "When Indicated"		5
Fluoroscope, Supplementary to Films		22
II. Tuberculin Testing Waived for Special Groups:		
Routine Chest Films for Faculty		1
Routine Chest Films for Food Handlers		3
III. Schools without Tuberculin Testing:		
Routine Chest Films for Students	13	17

test. A year ago only 17 colleges were able to boast of annual re-testing programs.

In 48 schools there is now compulsory tuberculin testing of all food handlers, an increase of 18 since last year's figures were published. We now find 38 colleges offering tuberculin tests to the faculty members, clerical staffs, and other miscellaneous groups. In a few instances, especially in small schools where there is very intimate campus and family intermingling, we hear of the tests being made available to faculty families.

A cross-section of the practices in vogue at various institutions as regards X-raying of students and others, showing an up-swing, among the group doing tuberculin testing, toward serial X-ray films for positive reactors (Table VI). Last year's Report listed 18 colleges providing films annually or oftener. This year there are 31 in that category, while 3 other institutions at least re-ray their positives before graduation. In the 1936-37 survey we called attention to the risk being run in 13 schools where the finding of a positive reactor did not lead to the taking of a chest X-ray. This year we are happy to record only one school that truly can be so classified.

A growing use of the fluoroscope as a diagnostic aid, especially supplementary to the preliminary film, is noted, though it is obvious that such a program is restricted necessarily to those colleges particularly well blessed with equipment, either their own or that of nearby institutions. Only five colleges now seem to be relying exclusively on the fluoroscopic screen to make a diagnosis of early tuberculous lesions in the lungs. As has been indicated before, this calls for the best of fluoroscopic equipment, an examiner of exceptional experience and judgment, and a favorable thoracic anatomy, if the minimal lesions are not to be overlooked. Along with, rather than instead of, good chest films, is where the fluoroscope can be predicted to confer its maximum benefits.

X-ray of the lungs without prior tuberculin test to discover who actually is infected is reported by one college with respect to its faculty, by three as regards food handlers, and by 17 as applied to students. Most of these schools have adopted such a program because they believe they are saving time and money by the shortcut, as well as because some of them report the discovery of interesting and clinically important non-tubercu-

TABLE VII.
Tuberculin Testing of American College Students, 1932 to 1938 (incl.).

Year	Total No. Tested†	Pct. Positive	Pct. Men Positive	Pct. Women Positive
1932-33	14,318	35.0	35.0	27.0
1933-34	25,184	30.3	30.0	26.0
1934-35	26,861	29.4	30.0	27.8
1935-36	31,601	30.0	31.0	28.0
1936-37	56,224	27.3	29.4	24.8
1937-38	64,232	25.8	29.8	23.5

†Due to the failure of some colleges to differentiate their reactors by sex, the total number tested is annually slightly greater than the sum of those reported according to sex.

lous pathology of bones, lungs, mediastinum and cardiovascular system. These points are freely admitted, and the high standard of work that obtains in these schools proves that the program is thoughtfully and meticulously carried out. The obvious flaw, however, is the old and reiterated truth that in such a procedure the physician never knows for sure how many or exactly who of his students should be considered cases of tuberculous infection. Certainly a lesion too minute to be discovered radiologically can render an individual tuberculin skin-positive. The tuberculin test, with all its shortcomings, and despite its cost in time and money, remains a very significant first screen in the search for early tuberculosis. It is now considered that all positive tuberculin reactors represent individuals whose bodies harbor viable tubercle bacilli, even though the lesions may not be macroscopic at the moment. Where it is elected to dispense with tuberculin testing, there should be care to secure re-rays of students' chests often enough to assure all the safety, if possible, of the double method of search.

Since the first figures were collected showing the results of tuberculin testing of college students throughout the United States in 1932-33, the annual Report has revealed a steady increase in the number of tests being given, and a slow, but steady fall in the percentage of positive reactors found. Table VII brings this out clearly, giving the figures for the whole tested student population, and also for men and women. In 1937-38 men, as usual, showed a higher positivity (29.8 per cent) than women (23.5 per cent), while the whole group of 64,232 students tested revealed 25.8 per cent positive reactors. In 1932-33 the last mentioned figure was 35 per cent. Part of the improvement is undoubtedly real, due to a lessening incidence throughout the country. Part of it must, in all fairness, be charged off against more complete figures, more experience in reading tuberculin reactions, the use of better standardized products, and the inclusion of more schools where virtually all are tested rather than merely special hazard students whose relative positivity runs high. We believe it is time, however, to begin the construction of a new Table of annual figures, restricting the reporting of positives to those in whom what we have referred to as an adequate dosage of tuberculin has been used. In that case, the figure for 1936-37 would be 30.5 per cent positive reactors found in 33,281 students, and in the year currently reported 28.9 per cent positives among 47,879 tested individuals. This is not an attempt to bludgeon schools into an acceptance of what the Committee may or may not be-

TABLE VIII.

Increasing Positivity to Tuberculin Shown with Advancing Age, 1936-37-38.*

Age**	No. Tested	No. Positive	Pct. Positive
17	3,685	757	20.5
18	10,491	2,221	21.1
19	6,825	1,639	24.0
20	4,734	1,207	25.5
21	3,551	956	26.0
22	2,418	711	29.4
23	1,511	478	31.6
24	978	320	32.7
25	627	220	35.0
26 to 30	1,377	600	43.5
31 to 35	462	269	58.2
above 35	350	231	66.0
Total	37,009	9,609	25.9

*Data furnished by 11 schools in 1936-37, and by 23 in 1937-38, from Special Questionnaire.

**Includes both sexes.

lieve represents a truly diagnostic dosage of tuberculin. But it does seem to us the only fair way to prepare an estimate of the incidence of tuberculous infection among college students. The final figure should not be diluted by the abnormally low percentages coming from those areas where the positives probably are just as numerous as elsewhere, yet where the method used is not sufficiently discriminatory to locate all of them.

The well recognized phenomenon of a progressive incidence of positive tuberculin tests as we examine students in advancing age brackets is again corroborated by the figures appearing in Table VIII, where it is seen that at age 17 (both sexes included), we may expect 20.5 per cent to give a positive reaction, while above 35 years of age the positives have reached a high figure, in this study, about 66 per cent. This impresses us with the obvious fact that infection of previous virgin soil is going on steadily during college years, and that we must not be content to accept the examination of entering students as a safe estimate of the tuberculosis census of the whole college. In the advancing age groups will we find not only increasing numbers of infected people, but there also can we expect to discover those showing progressive lesions. The search for tuberculosis must be a steady process, a repeated hunt, a patient going back over the same ground again and again. Tuberculosis does not sleep. Neither must the investigator lack alertness who would avoid it in himself or find it in others.

Our final analysis of the results achieved in 1937-38 is set forth in Table IX. Here in dramatic form is drawn a comparison of the case-finding in one group of colleges with the almost complete lack of it in another. In the schools with some type of tuberculosis program, even though it probably reached only a restricted number in many of the schools included, college physicians were at least doing the best they could to find tuberculosis early in as many students as their facilities could be made to embrace. There were 80 schools in this group which reported turning up *new* cases of tuberculosis. In all, they reported 229 cases finally deemed of the active or progressive type, as well as 372 diagnosed as re-infection tuberculosis in an apparently static or arrested phase. Because of tuberculosis so discovered and observed for varying periods of time, it was necessary for 134 students to leave college during the year. Where cases were allowed to remain in school under

TABLE IX.

New Cases of Pulmonary Tuberculosis Diagnosed Among College Students, 1937-38.

	Schools with NO Organized Tuberculosis Program	Schools with SOME Organized Tuberculosis Program
No. of Institutions	105	133
Approximate Total Enrollment	123,847	261,949
Schools Reporting New Cases of Tuberculosis Found in 1937-38	6	80
Schools Reporting No New Cases of Tuberculosis Found	99	53
No. of Clinically Active§ Cases Diagnosed	5	229
No. of Apparently Arrested§ Cases Diagnosed	8	372
Total No. New Cases Reported	13	601
No. of Students Who Left College Because of Tuberculosis	5	134

§Colleges were requested not to include so-called "childhood" or "primary" tuberculosis cases.

Generally recognized criteria of activity of lesions were specified.

further study, it was generally at the larger institutions where staff and facilities are such as to render such a procedure reasonably safe. In most of the smaller schools, the number of active cases found was matched by the number of withdrawals reported.

Even if we admit that a few of the cases included in the above may have been healed "childhood" tuberculosis, which we specifically asked to have excluded, the nature of the data submitted by the various examiners would indicate that such was seldom the case. The criteria of activity, for example, cited by each in reply to our question, were almost without exception those recommended by such accepted authorities as the National Tuberculosis Association. So that, even granting the discrepancies in agreement among the interpreters of X-ray films or other findings, we arrive at the conclusion that a very considerable amount of pulmonary tuberculosis was discovered in these fortunate and progressive schools. As a matter of fact, the work of Stiehm at the University of Wisconsin has shown that it is more likely for active cases, as revealed by acid-fast bacilli in the fasting stomach contents, to be listed as innocent than for the reverse to be true. There is probably too little rather than too much pulmonary tuberculosis being diagnosed among students. The value of the tuberculosis program to the individual student, whether he be the patient or the protected, is incalculable. Educationally alone, the effort is a thousand times justified, as a demonstration of how lives can be saved and a community safeguarded. This is "hygiene" that actually operates.

Compare these figures with those coming from a group of 105 colleges, where slightly less than half as many students as in the first group were enrolled. Some of these schools had Student Health Services; others did not. Though none of them had a tuberculosis case-finding program, as such, all were kind enough and sufficiently interested to reply to the questionnaire. In six colleges some few cases of tuberculosis had been uncovered by the physicians, probably because the patients had reported because of symptoms or because of some other condition for which they sought advice. At any rate, the total cases of active type numbered five, while the

apparently arrested cases reached eight. There were five who left college because of their illness, these being, without exception, the active cases found. Although we can only make a guess based upon the experience of the colleges with case-finding under way, there should have been found, instead of five, approximately 108 active cases among an enrollment represented by that group of colleges not yet engaged in organized search for tuberculosis. This is a staggering comparison for those interested in the health of students at such colleges to contemplate.

It is far from our purpose to belittle the opinions of others. We do, with some hesitation, therefore, quote from the letters received from a few of the colleges in the last discussed group. Generally these are the words of a president or a dean, yet some of them were written by physicians. Let us hear what they have to say, admitting that *we* are responsible for the *italics*:

"We have very strict entrance examinations and no one enters college who has any *signs, symptoms or other indications of TB.*"

"Upon entrance, examinations are given and *changes in temperature would be watched.*"

"We have had no activities along this line, *nor have we had any cases of tuberculosis* here in the past year."

"*So far as we know* we have had no cases of tuberculosis in college."

"There are no records and *no known cases* of students discovered to be tubercular of late years."

"No tuberculin tests have been made amongst the student body . . . and none were found having any *history or symptoms of the disease.*"

"I beg to advise you that *we have no tuberculosis* in _____ College."

"Only in cases where there seems to be *special reason* for it are any tests of this sort made."

"All students come to us with a careful physical examination by the home physician. *Therefore* we do not receive any tubercular cases."

"From my experience and knowledge of the place, I would say that *tuberculosis is not in any way a part here.*"

"Only one case of arrested tuberculosis has been at college during the past ten years, to my knowledge, and *he had to leave* in his second or third year."

"Our students come from *only the best homes.* We do not have any cases of tuberculosis."

"Routine chest roentgenograms were not made upon admission to the University, but were freely made on students *complaining of respiratory infections.*"

It may be easy for one medically trained or an informed and superior cynic to sit back and criticize the sincere people whose words we have taken the liberty to quote. We who know the limitations of a physical

examination in finding preclinical pathology, we who have learned from bitter experience to hold entrance medical certificates open to some degree of honest doubt, we who can testify that birth or social position are no bar to tuberculosis, are in a position to help these educators re-mold their present mistaken concept of tuberculosis among young people. The difficult task would seem to be for us to reach them effectively. Most are administrative officers, wholly divorced from clinical contacts, and with an idea of disease probably gained from the hygiene texts of the late 19th century. Appeals of one kind or another reach their desks in such endless profusion that they have come to look on health enthusiasts as just one more form of crank with whom they must contend in the daily business of running a college, usually with insufficient funds. Their eyes and minds are apt to be closed against the written or printed word as it ordinarily presents itself in a circular letter or a pamphlet. Nothing short of a personal disaster, a serious illness affecting a dear one, or a campus mishap too gross to be missed can be counted on to force entrance upon the otherwise occupied mind of the college president. Only one other course recommends itself to us, namely that ways and means be found to reach those we must convert to a modern appreciation of this problem through a system of personal visits by one qualified to present the facts in a convincing manner. The field worker should be well informed not alone as to tuberculosis control, but also as to the whole broad student health program of preventive medicine so that he may be of practical and immediate help to the officials he interviews. It may be that such a centrally sponsored campaign could be conducted, or it might be preferable to attempt it through the employment of local agencies, centrally spurred into action. We can recall health disasters that have led to the adoption of tuberculosis control plans by schools where even the insistent appeals of college physicians, convinced of the need, had failed to win attention up to that point. What we should like to witness would be the early conversion of all in authority who still doubt the necessity for such programs, without some unfortunate student's heart-breaking health crack-up having to occur to clinch the argument.

Under the caption: "Looking Ahead," we last year enumerated several goals we hoped to see approached, among them the special training of student health personnel along tuberculosis case-finding lines; the preparation of an illustrated hand book of procedures; research into the relative values of routine chest X-raying versus tuberculin test with X-ray for positives; an objective evaluation of the place of the fluoroscope in the early recognition of pulmonary tuberculosis; the standardization of tuberculosis records in the country's colleges, toward the achievement of uniformity of reports; the closer linking up of the family doctor and the college physician; the enlistment of local tuberculosis organizations to help colleges where a program is lacking or is making slow headway; the binding together of the student's health record in college with pre-college and post-graduation data. These items we mention again only to recommend them warmly for general consideration and

to bespeak for them the assistance each individual can supply. Working as a unit, presenting a united front against tuberculosis, that relic of the Dark Ages of Medicine, we can keep the enemy on the run, assured that his retreat will soon culminate in a complete victory for the forces of health.

Let us work toward the day when we can say confidently, not blindly, "There is no tuberculosis in our college"!

Respectfully submitted,

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PROGRESS

Historians tell us that one of the few things in this world impossible of accomplishment is for a member of one generation to so train his mind that he can think the thoughts of a previous generation. For that reason, it is often a privilege to talk to a survivor of a previous generation. An old time physician, who has added a score to the customary three score and ten, said to us the other day, "Do I believe in miracles? Yes. What you fellows did for my daughter-in-law a few years ago was a miracle to me. She had tuberculosis of the lungs, a fatal disease, and to make matters worse, she was pregnant. You fellows put air into her chest and she is alive and well today, and what is more, she also has a healthy child. That, to me, is the equal of any miracle of antiquity. I never saw that happen before."

About thirty years ago, I knew an elderly man who had chronic fibroid tuberculosis with bilateral cavities. He used to say, "I only hope that I can keep alive long enough—someday they are going to find a cure for this thing, and I want to be around to use it." Long since he has been laid away; but if he could look down today on the present scene, he would be surprised to realize that if he had lived in this generation his chances of having tuberculosis would be small. When alive, he had not imagined that prevention would progress faster than treatment.

By such contacts do we realize our advances. And they have been so fast that the pace may well lead those

who follow us to fail in the appreciation of the fundamental work done by our contemporaries.

The National Tuberculosis Association has been instrumental in making tuberculosis, and other infectious and preventable diseases, the responsibility of the Nation. It has pioneered and assisted in creating a public health consciousness. It is the plan of the National Tuberculosis Association to continue to assist present studies and control programs until tuberculosis becomes a minor factor in public health problems.

CHESLEY BUSH, M.D.,
Livermore, California,
President, National Tuberculosis Association.

THE PROBLEM OF HOUSING THE TUBERCULOUS

That the tuberculous patient must be housed is self-evident, but how he shall be housed is not so clear. Shall it be by the State, the County, or himself? The answer is not the same for every patient. As a result of varying factors, he may need, at various times, care in a general hospital, a sanatorium, an educational institution, an industrial colony, a home for incorrigibles, a home for chronic invalids, a penal institution, a hospital for mental diseases, or his own home.

The Sanatorium, unless it is a large institution, is not ordinarily equipped for major chest surgery or complicated diagnostic procedures. The patient's care in a large sanatorium or a class A general hospital for a limited period when necessary, should be a responsibility of

his local community, for which the same state aid should be provided as for his care in the local sanatorium. Considerable expense is involved in the present need for keeping tubercle bacilli carriers housed for indefinite periods at the Sanatorium long after surgical collapse and other efforts to render their sputum negative have failed. Why should not the State provide suitable care for such patients in some centrally located institution? In some other place, provision should be made for the comparatively few vicious and uncoöperative patients, who are wasting the time of physicians and the money of the taxpayers, by their wilfulness and malice. If they have positive sputum they should not be sent home but should be housed by the State where they can receive such care as they will permit.

The needs of those who have secured an arrest of their disease at the Sanatorium deserve especial consideration. Their studies and conferences with vocational advisors have prepared them for vocational training but often they are unable to take advantage of the instruction offered by the State Department of Education on account of lack of funds for living expenses. Others already equipped for employment and able to accept it can not leave the Sanatorium as they have no place to go. Only a small number can secure employment in the Sanatorium itself. For these patients the Melby Bill now before the legislature would provide assistance while they are taking training or until employment can be secured. It seems to be a step in the right direction.

Some of these persons with arrested disease should have sheltered employment, at least for a while. A State colony more or less like the Tomahawk Lake Camp in Wisconsin or the Papworth Colony in England would solve their problem. It would also afford useful and suitable work for those who for one reason or another could not be reabsorbed into industry. All of these matters should be considered in future plans for housing the tuberculous.

A. T. L.

TUBERCULOSIS CONTROL

Tuberculosis is being so successfully controlled in this country that the medical profession now visualizes the time when the disease will probably be as rare as typhoid fever and diphtheria. The result is that physicians are taking an active part by writing articles for medical journals and these journals are hastening the solution of the problem by publishing numerous articles, editorials, etc., on tuberculosis. This includes nearly all of our regional, state and national journals. For example, in 1937 there appeared in the *Journal of the American Medical Association*, seventeen original articles, 169 abstracts, and 129 miscellaneous notes, letters, editorials, etc., on tuberculosis.

In the April issue each year the JOURNAL-LANCET brings to date various phases of chest disease work in order that its readers may have the latest information. This year the articles contain much of value from the administration of the tuberculin test in the diagnosis of tuberculosis to total pneumonectomy for pulmonary malignancy. The authors of the various articles include

physicians in general practice, pediatricists, chest specialists, sanatorium superintendents, health department workers, and some of the most skillful chest surgeons in the nation. Articles from China and Argentina by Ch'iu and Chattas, who reside approximately 8,000 miles away, give us a glimpse into the tuberculosis work of their nations.

The Student Health Services of America have provided some of the finest contributions to our knowledge of medicine of all time. Their staffs are working in a phase of disease so sadly neglected in the past, namely its beginning. In a report of a five-year tuberculosis program among students at the University of Wisconsin soon to be published in the *American Journal of Medical Sciences*, Stiehm presents some valuable facts; indeed, facts that would be extremely difficult to obtain except among the university group. For example, his studies on gastric contents revealed tubercle bacilli in 72 per cent of minimal cases of pulmonary tuberculosis. Here the old criterion of waiting for sputum to appear to seek tubercle bacilli is vanishing and is being replaced by a method of finding them, often before sputum appears. Stiehm's program of finding tuberculosis among students on entrance and subsequently is so effective that only three have reported to his health service clinic in the past five years because of symptoms resulting from pulmonary tuberculosis. Here again the old method of waiting for symptoms and physical signs is vanishing and is being replaced by methods of detecting the disease in its pre-clinical stage.

In this issue of the JOURNAL-LANCET, Stiehm presents a method which is a definite advance in the X-ray examination of the chest. He has actually detected small infiltrations in the lungs by special fluoroscopic examinations which were not visible on the X-ray film exposed in the usual posterior-anterior diameter. In other words, his fluoroscopic examination supersedes that of the film in detecting evidence of small lesions in the upper lung field. By this method not only does he discover evidence of lesions absolutely missed by X-ray film examination but he finds every lesion that is detected by the X-ray film examination.

Over the past sixty-nine years the JOURNAL-LANCET has contained numerous articles on tuberculosis. Its present Editorial Board and publishers plan to keep its readers informed on the latest developments in this field.

J. A. M.

CONVENTION SEASON

June has been the month of choice for annual meetings of all medical associations in the north-central states. The American Medical Association too has usually selected this month for its convention. No one can deny that generally speaking it is an ideal time. Some disadvantage can be seen, however, in the possibility of conflicting dates, making it inconvenient for those who wish to attend more than one meeting, either as participants in the scientific program or as demonstrators and exhibitors.

Montana tried out the experiment last year of having a spring and a fall meeting, one of which was devoted

to scientific subjects and the other to matters of business administration.

In Minnesota, for some years there has been a winter meeting of county officers at which needs have been discussed and policies formulated for delegates to consider and have ready for presentation at the annual meeting. Even though this simplifies and makes the work at the regular meeting more effectual, it is still true that the deliberations imposed upon delegates takes up so much of their time that they have little opportunity to attend the scientific sessions. Provisions have been made, of course, that contemplate the transaction of all business on the day preceding the regular program, but if we have been rightly informed, there are adjourned sessions and duties that often conflict with interests during succeeding days. If this is true, some other plan deserves

consideration. As things are now, a business meeting might well be timed to coincide with some important period of the state legislature.

This year the South Dakota State Medical Association will meet at Aberdeen on April 24th, 25th, and 26th; the North Dakota Association at Fargo on May 8th, 9th, and 10th; the Medical Association of Montana at Butte on June 28th, 29th, and 30th; and the 86th annual meeting of the Minnesota State Medical Association will convene in Minneapolis May 31st, June 1st and 2nd. With the American Medical Association meeting in St. Louis from May 15th to 19th, it would seem that our conventions are staggered better than we have seen them for sometime.

A. E. H.

Book Reviews

Operative Gynecology, by HARRY STURGEON CROSSEN, M.D., and ROBERT JAMES CROSSEN, M.D.; 5th edition, heavy blue buckram, gold-stamped, 1,057 pages plus index, 1,264 illustrations including 3 in color; Saint Louis: The C. V. Mosby Company; 1938. Price, \$12.50.

This standard text was in need of revision, for it has been 7 years since any change was made in its contents. There are 200 new illustrations, and many new drawings. The chapter on anesthesia in gynecologic surgery and that upon the intestinal tract in relation to gynecologic surgery were written by H. S. BROOKES, Jr., M. D., who has made a special study of these subjects. As a surgical text applied to gynecology, there is probably no better work thus far extant. The senior author is professor emeritus of clinical gynecology in the Washington University School of Medicine, and ROBERT JAMES CROSSEN is assistant professor of clinical obstetrics and gynecology in the same institution.

Treatment in General Practice, by HARRY BECKMAN, M.D.; 3rd edition, revised and entirely reset, green cloth, gold-stamped, 683 pages plus bibliography and index, few illustrations, tables; Philadelphia: The W. B. Saunders Company; 1938. Price, \$10.00.

DR. BECKMAN, who is professor of pharmacology in the Marquette University School of Medicine at Milwaukee, is well-known to Northwest physicians because of his appearance at various medical society meetings. His new work is painstakingly done, and the publishers have happily let him make changes in the text at his own discretion. One of the most striking characteristics of BECKMAN's work is always a good list of references, and an examination of this book convinces one that BECKMAN has digested and discarded a number of other authorities. This is not in any sense a rearrangement of other authors; it is BECKMAN's individual labor supported by sound authorities. THE JOURNAL-LANCET cordially recommends this book.

Surgical Diseases of the Mouth and Jaws, by EARL CALVIN PADGETT, B.S., M.D., F.A.C.S.; 1st edition, green cloth, gold-stamped, 789 pages plus index, chapter-end references, 334 illustrations; Philadelphia: The W. B. Saunders Company; 1938. Price, \$10.00.

DR. PADGETT, who is associate professor of clinical surgery in the University of Kansas at Kansas City, is quick to realize that both dentists and physicians should contribute to knowledge

of diseases of the oral cavity, and to the development of methods of treatment and surgical approach. We find here an adequate consideration of the anatomy of the region under discussion; a good chapter (33) on the irradiation of malignant neoplasms; and an excellent appraisal of methods of anesthesia in the last chapter. It is interesting to learn that while Professor PADGETT has followed the headings recommended by the Curriculum Committee of the American Association of Dental Schools (1935), he has in many cases gone beyond those headings, with a more extensive inquiry and discussion. The book is valuable not only for the oral surgeon, but also for the laryngologist, otolaryngologist, rhinologist, and others.

The New International Clinics, edited by GEORGE MORRIS PIERSOL, M.D., and others; Volume 1, No. 1 (New Series), blue cloth, stamped in green & gold, 309 pages plus index, illustrated, bibliographies at article-ends; Philadelphia: The J. B. Lippincott Company; 1938. Price, \$3.00 (or \$12.00 annually).

THE JOURNAL-LANCET is pleased to commend the innovation by Lippincott's of issuing these famous *International Clinics* in bound volumes. They are very handsome, and exceedingly well-produced. The list of contributors to Volume 1, No. 1, is impressive. From Minnesota is LEO G. RIGLER, M.D., professor of radiology in the University of Minnesota Medical School, with "Roentgen Diagnosis in Medical Practice—Its Possibilities & Limitations." Other noteworthy papers by LONGCOPE, JEGHERS, CHRISTOPHER, SAMUEL WEISS, are included, plus three very helpful clinics by J. H. MASON. The J. B. Lippincott Company will not regret this new venture. Four volumes are issued annually at \$3.00 each.

The Practice of Urology, by LEON HERMAN, B.S., M.D., professor of Urology, University of Pennsylvania, Graduate School of Medicine; 923 pages; Philadelphia: W. B. Saunders & Co.

This is a well-written presentation of the methods of diagnosis and treatment of diseases of the urogenital system. Coming from the extensive clinical experience of one of our foremost teaching urologists, this book offers to the general practitioner, the general surgeon, and the genito-urinary surgeon adequate detailed descriptions of all available diagnostic and therapeutic procedures. The practical application of these methods in urologic and general practice is described. Of interest, is the fact that this is the first modern urological work to include the sulfanilamide treatment of gonococcal infections.

Many illustrations, including sketches and drawings, are used to emphasize descriptions in the text.

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Future Meetings

PROGRAM

SOUTH DAKOTA STATE MEDICAL ASSOCIATION MEETING

Monday, April 24, 1939

- 10:00 A. M. First Council Meeting.
2:00 P. M. First Meeting of the House of Delegates.
7:00 P. M. Second Meeting of the House of Delegates.

Scientific Program, South Dakota State Medical Association

Civic Auditorium Theatre, Aberdeen, S. Dak.
Tuesday, April 25, 1939

MORNING

- 8:30—9:30 Orthopedic Clinic—Henry W. Meyerding, M.D., F.A.C.S., associate professor of orthopedics, Mayo Clinic, Rochester, Minn.
9:30—10:30 Medical Clinic—Don C. Sutton, M.D., associate professor of medicine, Northwestern Medical School, Chicago, Ill.
10:30—10:50 Intermission—Visit Exhibits.
10:50—11:50 Obstetrics and Gynecology Clinic. Edward Allen, M.D., F.A.C.S., Presbyterian Hospital, Rush Medical School, Chicago, Illinois. The South Dakota State Board of Health is supplying this clinic.
12:00—1:30 Noon Intermission.

AFTERNOON

- 1:30—2:00 "Arteriosclerosis—Etiology, Symptoms and Treatment." Don C. Sutton, M.D., Northwestern University.
2:00—2:45 "Endometriosis". Edward Allen, M.D., F.A.C.S., Rush Medical School. (Supplied by the State Board of Health.)
2:45—3:15 "An Analysis of Factors in Personality Influencing Health." Hewitt B. Hannah, M.D., Minneapolis, Minn.
3:15—3:35 Intermission—Visit Exhibits.
3:35—4:20 "Physiological Phenomena Which Are Misinterpreted as Nasal Disease." Henry W. Williams, M.D., assistant professor of otolaryngology and rhinology, Mayo Clinic, Rochester, Minn.
4:20—5:05 "Venereal Disease Control." State Board of Health.

EVENING

- 7:00 Banquet. Alonzo Ward Hotel.
9:00 Smoker (Stag). Aberdeen Country Club.

Civic Auditorium Theatre Wednesday, April 26, 1939

MORNING

- 8:30—9:15 Urological Clinic—Harry Culver, M.D., department of urology, Northwestern Medical School and Cook County Hospital, Chicago, Ill.
9:15—10:00 Medical Clinic — Clifford J. Barborka, M.D., F.A.C.P., department of medicine, Northwestern University, Chicago, Ill.
10:00—10:45 X-ray Symposium — Fay Squire, M.D., roentgenologist, Presbyterian Hospital and Rush Medical School, Chicago, Ill.
10:45—11:05 Intermission—Visit Exhibits.
11:05—11:50 Surgical Clinic — Edwin Miller, M.D., F.A.C.S., department of surgery, Rush Medical School and Presbyterian Hospital, Chicago, Ill.
11:50—1:30 Noon. Alumni Luncheons—Rush Medical, Northwestern, Minnesota, and probably others.

AFTERNOON

- 1:30—2:00 "Recent Advances in Nutrition." Clifford J. Barborka, M.D., F.A.C.P., Chicago, Ill.
2:00—2:30 "Obstructions in the Bowel in the New-born." Edwin M. Miller, M.D., F.A.C.S., Chicago, Ill.
2:30—3:00 "Epithelial Tumors of the Bladder." Harry Culver, M.D., Chicago, Ill.
3:00—3:20 Intermission—Visit Exhibits.
3:20—3:50 "Value of Radiation Therapy." Fay Squire, M.D., Chicago, Ill.
3:50—4:35 J. C. Ohlmacher, M.D., South Dakota State Medical School.

SOUTH DAKOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Program

School Auditorium Band Room
Tuesday, April 25, 1939

- 9:00 A. M. "Perforating Injuries of the Eye." Dr. E. A. Rudolph, Aberdeen, S. Dak.
10:00 A. M. "Effect of Radium in Maintaining Patency in the Nasofrontal Duct." "External Operations on the Frontal Sinus." Dr. Henry L. Williams, Mayo Clinic, Rochester, Minn.
11:00 A. M. "Routine Ocular Muscular Investigation." Dr. Walter Fink, Minneapolis, Minn.
12:00 A. M. "Suppurations in the Neck." Dr. H. P. Rosenberger, Bismarck, N. Dak.

PROGRAM

THE NORTH DAKOTA STATE MEDICAL ASSOCIATION MEETING

May 8, 9, 10, 1939
 Fargo, North Dakota

May 8, 1939

Meeting of the House of Delegates.
 Meeting of the North Dakota State Board of Health.

May 9, 1939

MORNING SESSION

- 9:00 Diagnosis and Management of the Surgical Gall-bladder. E. M. Jones, M.D., St. Paul, Minn.
 9:45 Maternal Mortality in North Dakota. John H. Moore, M.D., Grand Forks, N. Dak.
 10:15 View Exhibits.
 10:30 Medical Conditions Complicated by Pregnancy. Ralph A. Reis, M.D., Chicago, Ill.
 11:15 Syphilis—Problems in the Treatment of Syphilis. H. E. Michelson, M.D., Minneapolis, Minn.

AFTERNOON SESSION

- 2:00 Dermatology for the General Practitioner. H. E. Michelson, M.D., Minneapolis, Minn.
 2:45 Medical Legislation. L. W. Larson, M.D., Bismarck, N. Dak.
 3:15 View Exhibits.
 3:30 Diagnosis and Treatment of Eye, Ear, Nose and Throat Conditions Which Are of Particular Interest to the General Practitioner. A. D. McCannel, M.D., Minot, N. Dak.
 4:15 Office and Hospital Management of Ano-rectal Diseases. L. A. Buie, M.D., Rochester, Minn.

May 10, 1939

MORNING SESSION

- 9:00 Emergency Orthopedic Problems. H. J. Fortin, M.D., Fargo, N. Dak.
 9:45 Virus Diseases, U. S. Public Health Department.
 10:30 View Exhibits.
 10:45 An Approach to Some Common Behavior Problems. F. C. Rodda, M.D., Minneapolis, Minn.
 11:15 Diagnosis and Treatment of Cardiac Emergencies. F. J. Hirschboeck, M.D., Duluth, Minn.

AFTERNOON SESSION

- 2:00 The Indication and Technique of Artificial Pneumothorax, Thoracoplasty and Extrapleural Pneumothorax in the Treatment of Pulmonary Tuberculosis. G. A. Dodds, M.D., San Haven, N. Dak.
 2:45 Arterial Hypertension—Prognosis and Management. S. Marx White, M.D., Minneapolis,
 3:30 View Exhibits.
 4:00 Diagnosis and Treatment of Gastro-intestinal Hemorrhage. F. J. Hirschboeck, M.D., Duluth, Minn.

BOOK REVIEWS—(Continued)

Avian Tuberculosis Infections, by WILLIAM H. FELDMAN, D.V.M., M.S.; Baltimore, The Williams & Wilkins Co., 1938. Price, \$7.00.

Because the rôle of the avian tubercle bacillus in tuberculous infections is not well understood, WILLIAM H. FELDMAN has attempted to provide within this single volume a source where information concerning questions relating to the avian tubercle bacillus will be available. This volume is written especially for the veterinarian, experimentalist, laboratorian, teacher and physician. The volume is well illustrated with a generous number of original photographs. A short foreword is written by Dr. FRANK C. MANN, in which he states that this volume fulfills all the requirements of a worthwhile monograph on the subject of avian tuberculosis.

Surgical Anatomy (second edition), by C. LATIMER CALLANDER, A.B., M.D., F.A.C.S., associate clinical professor of surgery and topographic anatomy, University of California Medical School; member of Founders' Group of the American Board of Surgery; member of American Association of Traumatic Surgery; associate visiting surgeon to the San Francisco Hospital: second edition, entirely reset, 858 pages with 819 illustrations; Philadelphia: W. B. Saunders Co., 1939. Price, \$10.00.

Much of the second edition of Dr. CALLANDER'S *Surgical Anatomy* has been rearranged and in many instances rewritten. This has allowed for required additions of new surgical procedures and for deletion of unessential text and illustrations. In order to develop the more common step-by-step surgical procedures, many large pen-and-ink illustrations have been added to this second edition. The legends under the illustrations clarify the surgical technic rather than a lengthy description of this technic in the text.

Several new advances in surgical anatomy and technic are included. Lumbar sympathetic ganglionectomy and resection of the sacral plexus are emphasized, and the technic of these operations is illustrated. The new syndrome, sacral anticus and cervical rib, is emphasized, and surgery of the intervertebral discs and of the ligamentum flava have been introduced for the first time.

Dr. DEAN LEWIS of the Johns Hopkins Hospital offers a foreword to the second edition. He emphasizes the need of a book such as Dr. CALLANDER'S *Surgical Anatomy*, in which anatomy and its surgical application are considered together and in close sequence.

Surgical Pathology of the Diseases of the Mouth and Jaw, by A. E. HERTZLER, M.D., tenth volume of the series of monographs on Surgical Pathology by Dr. HERTZLER; 206 illustrations; Philadelphia: J. B. Lippincott Co. Price, \$5.00.

This volume completes the ten-volume series on surgical pathology by Dr. HERTZLER. Because pathology and surgery of the mouth and jaw have become such a specialized field, Dr. HERTZLER apologizes for his limited material. He also mentions the photographic difficulty of taking pictures of the mouth and upper respiratory passages. He makes it a rule, however, not to describe any material that he has not seen, and therefore this volume does not include pathological photographs from other surgical treatises.

Dr. HERTZLER also apologizes for the use of some bibliographical material which he has not personally read in the original. He states, "If the papers cited are not good, do not blame me, I have not read them."

This volume is very logically arranged in sections describing benign and malignant diseases of the various tissues surrounding the mouth and jaws. It is generously and beautifully illustrated and makes a fitting contribution for the completion of Dr. HERTZLER'S monographs on surgical pathology.

News Items

A pneumonia school for all doctors and laboratory technicians in western Montana was sponsored at Montana State University, Missoula, February 23 to 25 by the University and the state board of health. Dr. W. F. Cogswell, secretary of the state board of health, and Dr. Donald M. Hetler, chairman of the University's bacteriology and hygiene department, were in charge. Others who took important parts in lectures and laboratory demonstrations are: Dr. E. D. Hitchcock, pathologist at the Great Falls Clinic; Dr. M. B. Hesdorffer, University physician; Dr. R. F. Peterson of the Murray hospital, Butte; Dr. B. K. Kolbourne, state epidemiologist, Helena; and Edith Kuhns, director of the laboratory for the state board of health. This was the first pneumonia school ever held for Montana physicians.

Dr. Ray Lemley, of Rapid City, South Dakota, sailed in February for Hungary, where he will engage in research. Dr. Lemley is a brain specialist.

Dr. O. E. Enroth, who for the past year and a half has been associated with Dr. E. R. Sterner at White Bear Lake, Minnesota, has taken over the entire practice. Dr. Sterner will devote his time to his St. Paul office.

Dr. Richard Herbst, Minneapolis, has gone to Hawley, Minnesota, to take over the practice of the late Dr. M. C. Bergheim.

Dr. L. E. Lande, formerly of Burbank, California, is now practicing in Winner, South Dakota. He is associated with Dr. R. V. Overton. Dr. Lande was graduated from the school of medicine at Iowa State University in 1928. He practiced at Havre, Montana, and later at Burbank.

The vital statistics report of the South Dakota State Board of Health recently disclosed that heart disease and pneumonia were the leading causes of the 454 deaths in the state during January. Heart disease caused the death of 106 persons while pneumonia killed 59. Other diseases and the mortality number were: cancer, 48; apoplexy, 41; kidney disease, 22; diabetes and senility, 11 each; appendicitis, 8; tuberculosis, 8; influenza, 7; measles, 6; syphilis, 3; infantile paralysis, 1. Fifty infants died before they reached the age of one year. Six persons were killed in motor vehicle accidents.

The International College of Surgeons, in connection with the United States Chapter of that body, will hold its Assembly in New York City at the Hotel Roosevelt May 22, 23 and 24, 1939. Dr. Edward Frankel, Jr., of New York City, has been appointed by the International officers as General Chairman.

Dr. Louis Fligman of Helena was elected president of the Montana branch of the American College of Physicians at a meeting of the branch held in Butte, February 26, 1939. Dr. M. D. Winter, Miles City, was elected vice-president and Dr. H. C. Watts, Fort Harrison, secretary-treasurer.

Dr. K. P. Caveny, who has been associated with Dr. V. A. Mulligan in Langdon, North Dakota, for the past year, has purchased the practice and equipment of the late Dr. C. J. King of Langdon, and is practicing independently.

Dr. C. C. Smith, Mandan, North Dakota, was named chief of staff of the Mandan Deaconess hospital at the meeting held March 7, 1939. Dr. G. H. Spielman was named assistant chief of staff and Dr. H. A. Wheeler, secretary.

New officers of the Minneapolis Surgical society are: Dr. Willard D. White, president; Dr. L. Haynes Fowler, vice-president, and Dr. H. M. Lee, member of the executive council. Dr. Harvey Nelson has been reelected secretary-treasurer.

The twenty-fourth annual convention of the Catholic Hospital Association of the United States and Canada will be held at the Milwaukee Auditorium, Milwaukee, Wisconsin, June 12th to 16th, 1939.

Dr. R. T. St. Clair and Dr. F. A. Ellis have moved from New Rockford to Northwood, North Dakota.

According to the annual report of the Butte, Montana, Anti-Tuberculosis society, 1,576 examinations were made in 103 clinics during the past year.

Dr. J. L. Devine, Jr., a graduate of Georgetown Medical School in 1937, is now associated with his father, Dr. J. L. Devine, in Minot, North Dakota.

Governor Stassen of Minnesota has named a committee of psychiatrists to study methods of handling criminal insane and particularly sex criminals. Those selected are: Dr. H. B. Hannah, Minneapolis; Dr. Fred P. Moersch, Rochester; Dr. Gordon B. Kamman, St. Paul; Dr. George H. Freeman, St. Peter; Dr. Alexander G. Dumas, Minneapolis; Dr. L. R. Gowan, Duluth; Dr. Alex Blumstein, Minneapolis; Dr. M. W. Kemp, Moose Lake.

Dr. W. E. Shute of Windsor, Ontario, is now practicing at Devils Lake, North Dakota. He is associated with Dr. John D. Graham.

The Montana state department of public welfare will conduct a crippled children's clinic in Glasgow, April 12.

Dr. R. T. LaVake, Minneapolis, has been elected president of the Abbott hospital staff. Other officers are: Dr. L. R. Boies, vice-president; Dr. Ralph Creighton, secretary; Dr. O. J. Campbell, Dr. E. F. Robb and Dr. Jay Davis, directors.

Dr. S. B. Solhaug has been named chief of obstetrics and Dr. E. S. Lippmann, chief of pediatrics at the Maternity hospital, Minneapolis.

Dr. Philip Arzt, staff physician, has been appointed acting superintendent of the Jamestown (North Dakota) State Hospital for the Insane. The appointment was made by the State Board of Administration.

Fifty of Montana's fifty-six counties are participating in the April enlistment campaign of the Women's Field army for the Control of Cancer, according to the announcement made by the state commander, Mrs. H. W. Peterson of Billings.

A series of infant and pre-school conferences were held in Williston, North Dakota, in March. Sponsored by the county advisory committee on health, the conferences were held in coöperation with the local board of health, the division of child hygiene of the state health department, and physicians and dentists.

The American Association of Obstetricians, Gynecologists and Abdominal Surgeons announces that the annual Foundation Prize for this year will be \$100.00. Those eligible include only (1) interns, residents, or graduate students in obstetrics, gynecology, and abdominal surgery, and (2) physicians (M.D. degree) who are actually practicing or teaching obstetrics, gynecology, or abdominal surgery. Competing manuscripts must (1) be presented in *triplicate* under a *nom-de-plume* to the secretary of the association before June 1st, (2) be limited to 5,000 words and such illustrations as are necessary for a clear exposition of the thesis, and (3) be type-written (double-spaced) on one side of the sheets, with ample margins. The successful thesis must be presented at the next annual (September) meeting of the association, without expense to the association and in conformity with its regulations. For further details, address Dr. James R. Bloss, Secretary, 418—11th Street, Huntington, W. Va.

Beginning Wednesday, April 26, and continuing for five consecutive Wednesdays, the third annual series of the Postgraduate Course for Physicians in Obstetrics and Pediatrics will be presented in ten centers of the state. This course is sponsored jointly by the Minnesota State Medical Association, the Medical School of the State University, and the Minnesota Department of Health. It is financed by Maternal and Child Health funds coming to the Minnesota Department of Health under the provisions of the Social Security Act. The dates and places for the meetings are as follows: April 26—Pine City and Winona; May 3—Fergus Falls and Little Falls; May 10—Willmar and Virginia; May 17—Worthington and Grand Rapids; May 24—Albert Lea and Crookston. The meetings will be conducted in the same manner as last year. There will be one full day meeting in each center, beginning promptly at 8 o'clock in the morning, and composed of eight lecture and discussion periods, four each on obstetrics and pediatrics. Further information covering the details of arrangements will be mailed to the physicians in the near future.

DISTRICT OFFICERS

South Dakota State Medical Association for 1939

District officers of the South Dakota State Medical Association for 1939 are as follows:

DISTRICT No. 2, WATERTOWN: President, A. E. Johnson, Watertown; vice-president, E. S. Watson, Estelline; secretary-treasurer, M. C. Rousseau, Watertown; delegates, H. R. Brown, Watertown, and H. J. Aldrich, Watertown; board of censors, A. H. Christensen, Clark; H. R. Brown, Watertown, and M. C. Jorgenson, Watertown.

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ATTENTION SECRETARIES OF DISTRICT SOCIETIES

Space is at your disposal in *The Journal-Lancet* for advance notices and reports of meetings of your society and personal news items concerning members of your society. County and district secretaries are invited to forward such material to *The Journal-Lancet*, 84 S. 10th St., Minneapolis.

Necrology

Dr. A. Y. Thompson, 59, of Larimore, North Dakota, died in Grand Forks, Feb. 26, 1939.

Dr. Finley C. Spates, 83, St. Paul, Minnesota, died February 27, 1939. He had practiced in St. Paul for 52 years.

Dr. Thomas Lowe, 81, of Pipestone, Minnesota, state representative from that city, died March 12, 1939. He was a pioneer physician of Southwestern Minnesota.

Dr. E. V. Bobb, 64, former Mitchell, South Dakota, resident, died at his home in Alhambra, California, March 4, 1939. Dr. Bobb began practicing medicine in South Dakota in 1899. From 1920 to 1924, he was mayor of Mitchell.

Dr. Max Dorland, 60, Redondo Beach, California, former Anaconda, Montana, doctor, died February 18, 1939. Dr. Dorland left Anaconda in 1922.

Dr. Daniel L. Scanlan, 67, Volga, South Dakota, died March 3, 1939. Dr. Scanlan was president of the South Dakota state medical association in 1919 and active in its work for more than 30 years.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON FEBRUARY 11, 1939
BY EXAMINATION

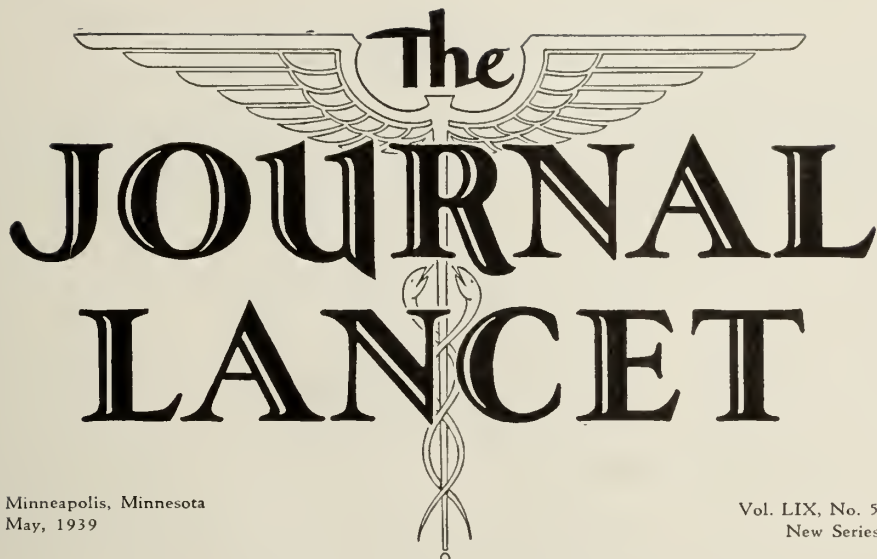
Name	School	Address
Anderson, Hubert Louis	U. of Minn., M.B. 1938	125 W. College Ave., St. Paul, Minn.
Bickel, William Harold	Northwestern U., M.D. 1936	Mayo Clinic, Rochester, Minn.
Bigler, Ivan Edward	U. of Minn., M.B. 1938	St. Mary's Hospital, Duluth, Minn.
Dorton, Howard Ellsworth	U. of Illinois, M.D. 1937	Mayo Clinic, Rochester, Minn.
Eck, Raymond Livingston	U. of Minn., M.D. 1938	Livingston, Montana
Eisenstadt, William Sawyer	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
English, John Paul	U. of Penna., M.D. 1935	Mayo Clinic, Rochester, Minn.
Fiel, Charles Augustus, Jr.	Indiana U., M.D. 1936	Mayo Clinic, Rochester, Minn.
Fleming, Dean Stephen	U. of Minn., M.D. 1937	2205 Newton Ave. S., Minneapolis, Minn.
Guthrie, Robert Fulmer	Emory U., M.D. 1934	Mayo Clinic, Rochester, Minn.
Harley, Robison Dooling	U. of Penna., M.D. 1936	Mayo Clinic, Rochester, Minn.
Harper, Samuel Bowman	U. of Wis., M.D. 1937	Mayo Clinic, Rochester, Minn.
Hedemark, Norman George	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
Hursh, Marion Douglas	U. of Minn., M.D. 1938	Lake City, Minn.
Idstrom, Linneus G.	U. of Minn., M.B. 1938	Swedish Hospital, Minneapolis, Minn.
Johnson, Allen Gray	U. of Minn., M.B. 1938	St. Mary's Hospital, Duluth, Minn.
Johnson, Karl Eugene	U. of Minn., M.D. 1938	1926 W. Superior St., Duluth, Minn.
Kamish, Robert James	U. of Minn., M.D. 1938	3453 Colfax Ave. S., Minneapolis, Minn.
Keithahn, Elmer Edward	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
Little, Alexander Graham, Jr.	Johns Hopkins U., M.D. 1937	Mayo Clinic, Rochester, Minn.
Loken, Selmer Milo	Rush Medical Col., M.D. 1938	559 Capitol Blvd., St. Paul, Minn.
Magnuson, Allen Einer	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
McCallig, John J.	U. of Oregon, M.D. 1937	Mayo Clinic, Rochester, Minn.
McHefey, George Jerome	U. of Michigan, M.D. 1930	Mayo Clinic, Rochester, Minn.
Nachtigall, Henry Blum	U. of Minn., M.B. 1938	Fordham Hospital, New York City.
Patton, William Burgamy	Johns Hopkins U., M.D. 1935	Mayo Clinic, Rochester, Minn.
Pedersen, Roy Clarence	U. of Minn., M.B. 1938	St. Mary's Hospital, Duluth, Minn.
Prunty, Francis Crandall	Jefferson, M.D. 1931	Mayo Clinic, Rochester, Minn.
Rasmussen, Waldemar Curtis	U. of Minn., M.D. 1936	Mayo Clinic, Rochester, Minn.
Robinson, Francis Joseph	Northwestern U., M.D. 1936	Mayo Clinic, Rochester, Minn.
Scheifley, Charles Holland	U. of Minn., M.B. 1937	Mayo Clinic, Rochester, Minn.
Sealy, William Burgess	U. of Texas, M.D. 1934	Mayo Clinic, Rochester, Minn.
Strem, Edward Louis	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
Svien, Hendrik J.	U. of Minn., M.D. 1938	Mayo Clinic, Rochester, Minn.
Weaver, Paul Henry	Ohio State U., M.D. 1938	Swedish Hospital, Minneapolis, Minn.
Williams, John Arthur	U. of Minn., M.B. 1938	340 North Cleveland Ave., St. Paul, Minn.
Wilson, Ira Herman	U. of Minn., M.D. 1935	Mayo Clinic, Rochester, Minn.
Woods, Robert Max	Marquette U., M.D. 1938	Mayo Clinic, Rochester, Minn.
Yugend, Sidney Frederick	U. of Minn., M.D. 1938	706 Laurel Ave., St. Paul, Minn.

BY RECIPROCITY

Fishback, Charles Franklin	Northwestern U., M.D. 1933	U. of Minn. (Dept. of Pathology), Minneapolis, Minn.
Fleming, Ralph Gibson	U. of Penna., M.D. 1936	Mayo Clinic, Rochester, Minn.
Hyslop, Leland Francis	Northwestern U., M.D. 1925	3126 Penn Ave. N., Minneapolis, Minn.
Meriwether, Lodwick Sterritt	U. of Virginia, M.D. 1931	Mayo Clinic, Rochester, Minn.
Polan, Charles Gabriel	Rush Medical Col., M.D. 1936	412 S. E. Walnut St., Minneapolis, Minn.
Rein, Walter John	U. of Wis., M.D. 1935	503 Donaldson Bldg., Minneapolis, Minn.

NATIONAL BOARD CREDENTIALS

Lowry, Elizabeth C.	Cornell U., M.D. 1935	1779 Humboldt Ave. S., Minneapolis, Minn.
Lowry, Thomas	Cornell U., M.D. 1935	1147 Med. Arts Bldg., Minneapolis, Minn.
Phillips, Richard Betts	U. of Edinburgh, M.D. 1933	Mayo Clinic, Rochester, Minn.
Wilson, William Hildebrand	Northwestern U., M.D. 1938	Mayo Clinic, Rochester, Minn.



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Chemical Blood Analyses of Clinical Significance*

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Minneapolis, Minnesota

CHEMICAL analysis of the blood furnishes information of value in the diagnosis, prognosis and treatment of clinical conditions in all branches of medicine. Blood may be regarded as a physiochemical system in which the chemical constituents reflect the metabolic processes going on in the body. Since one of its most important functions is to act as a transportation system to carry oxygen and nutritive materials to the tissues and to convey waste products to the excretory organs, it is evident that faulty metabolism or improper elimination may frequently be demonstrated by a chemical analysis of blood. The significance of results so obtained can readily be ascertained by comparison with established normals.

In Table I are listed the normal values and those clinical conditions in which deviations from the normal are characteristic. It must be remembered that these values are not absolute and that changes do not necessarily always occur.

Some general considerations of practical importance which arise in connection with a chemical blood analysis should be considered. It is essential that blood specimens be secured under as nearly uniform conditions as possible. In infants blood should be drawn just before a feeding or preferably after omission of one regular feeding; in children and adults after a 12 to 14 hour fast. All values for blood constituents referred to as "normal" are those obtained from fasting specimens. When pH, CO₂ content and chlorides are to be determined, the

blood should be collected over mercury or under pure mineral oil to prevent loss of CO₂ and hence to prevent important shifts in the electrolytes between cells and serum.

Since most analyses are made on plasma or serum, the latter should be removed from the cells immediately after the blood is centrifuged. Analyses should be made promptly after the blood is drawn or at least carried to a point in the particular method where it can safely be left without the danger of further change. Such changes as glycolysis, decomposition of nitrogenous substances and hydrolysis of the organic phosphorus compounds of the cells take place very rapidly in vitro. Hemolysis interferes with certain determinations and so should be avoided so far as possible. For example, since nearly all of the potassium of blood is in the cells, it may be greatly increased in hemolyzed specimens. The anticoagulants most frequently used are the oxalates or citrates of potassium, sodium, or ammonia in a concentration of 0.1 to 0.2 per cent. The amount should be kept to a minimum as an excess interferes with precipitation of proteins and also with uric acid determinations. Even in comparatively low concentrations such anticoagulants may cause slight shifts of water and electrolytes between cells and serum and alterations in the carbon dioxide combining power.

Results are generally expressed in milligrams per 100 cc. of serum, plasma or whole blood. The concentrations of the various inorganic constituents are also frequently represented by milliequivalents per liter. A milliequiva-

*From the department of pediatrics, University of Minnesota.

TABLE I.
Chemical Constituents of Human Blood

Blood Constituent	Normal Range	Pathologic Conditions in Which Abnormal Values Occur	
		Increased in	Decreased in
Total solids	(per 100 cc.) ¹ 19—23	Anhydremia	Hydremic plethora; anemias
Hemoglobin (Haden)	15.6 gm.	Polycythemia; dehydration	Anemias, primary and secondary
Total non-protein nitrogen	25—35	Nephritis; eclampsia; metallic poisoning; intestinal obstruction; prostatic obstruction; Addison's disease; dehydration; hemorrhage	
Urea nitrogen	10—15	(See non-protein nitrogen)	
Uric acid	2—3.5	Gout, idiopathic and lead; toxemias of pregnancy, eclamptic and nephritic; cardiac decompensation; nephritis; leucemia; polycythemia; chronic eczema and allied dermatoses; fatal chloroform poisoning; prolonged fasting.	Icterus
Creatinine	1—2	Nephritis	
Creatine	3—7	Nephritis; severe traumatic injury of muscle; catatonic states	Deteriorating dementia praecox
Amino acid nitrogen	5—8	Liver disease with extensive destruction; severe nephritis; leucemia	
Total proteins (plasma)	6.5—8.2 gm.	Anhydremia; multiple myeloma	Nephrosis; nutritional edema; essential hypoproteinemia due to atrophy and cirrhosis of the liver
Albumin (plasma)	4.6—6.7 gm.	Anhydremia	(See total proteins)
Globulin (plasma)	1.2—2.3 gm.	Nephrosis; uremia; multiple myeloma; syphilis; pneumonia; anaphylaxis; kala-azar	Essential hypoproteinemia due to atrophy and cirrhosis of the liver
Fibrinogen (plasma)	0.3—0.6	Acute infectious diseases	Cirrhosis of the liver; chloroform or phosphorus poisoning; acute yellow atrophy of the liver; severe anemias; typhoid fever
Total fatty acids (plasma)	190—450	Lipemias; ether narcosis; diabetes, uncontrolled; pneumonia; nephritis; anemias.	
Total cholesterol (whole blood) (plasma)	150—230 100—230	Nephrosis; hypothyroidism; severe diabetes, uncontrolled; biliary obstruction; xanthomatoses; ketogenic diet; pregnancy	Hyperthyroidism; uremia; acute infections; syphilis; leprosy; tuberculosis
Cholesterol, free (plasma)	30—138	Pregnancy	
Cholesterol, esters (plasma)	40—160	Pregnancy	Acute infections
Lecithin (plasma)	175—330	Diabetes, uncontrolled; anemias (R.B.C.); pregnancy; hypothyroidism; syphilis	Anemias (plasma)
Iodine number ² (plasma)	100—120		Infantile eczema; acute infections; lipemias
Icteric index	3.5—5.5	Hemolytic anemias; liver disease; obstructive jaundice	
Van den Bergh bilirubin	0.1—0.25	Biliary obstruction; hemolytic anemias	
Glucose	70—120	Diabetes, uncontrolled; cerebral lesions; asphyxia; hypercorticoadrenalism; dehydration; hyperpituitary stages of acromegaly; hyperthyroidism	Hyperinsulinism 1. Insulin overdosage 2. Idiopathic 3. Adenoma of the pancreas Liver diseases; Addison's disease; chloroform poisoning; recurrent vomiting in children; progressive muscular dystrophy; hypopituitary stages of acromegaly; hypothyroidism; glycogenosis
Total acetone bodies ³ Acetone + aceto-acetic ³ B Hydroxybutyric acid ³	0.8—2.6 0.3—2.0 0.5—3.0	Diabetic acidosis; starvation	
O ₂ capacity O ₂ content (arterial blood) O ₂ content (venous blood)	16—24 vol. 15—23 vol. 10—18 vol.	Polycythemia; anhydremia	Anemias; cardiac and respiratory diseases
Lactic acid	5—20	Exercise; asphyxia; eclampsia; hyperinsulinism	
pH	7.33—7.43	Alkalosis, uncompensated (see CO ₂ combining power)	Acidosis, uncompensated (see CO ₂ combining power)

TABLE I. (Continued)
Chemical Constituents of Human Blood

Blood Constituent	Normal Range	Pathologic Conditions in Which Abnormal Values Occur	
		Increased in	Decreased in
CO ₂ combining power (plasma)	45—60 vol.	Alkalosis 1. Hyperpnea 2. Vomiting 3. Excess intake of alkali	Acidosis 1. Diabetes, uncontrolled 2. Nephritis 3. Diarrhea 4. Asphyxia
CO ₂ content (plasma of arterial blood)	45—55 vol.		
CO ₂ content (plasma of venous blood)	50—60 vol.		
Total phosphorus (plasma)	8—18		
Lipoid phosphorus (plasma)	5—13	(See lecithin)	(See lecithin)
Acid soluble phosphorus (plasma)	2.5—5.5		
Inorganic phosphorus (plasma) adults children	3—4 4—6	Renal rickets; nephritis; hypoparathyroidism; uremia	Infantile rickets; coeliac disease; hyperparathyroidism
Phosphatase (plasma) adults children	0.1—0.21K.U. ⁴ 1.5—4.00B.U. ⁵ 5.0—12.00B.U.	Osteitis deformans; generalized osteitis fibrosa; osteomalacia; infantile rickets; renal rickets	
Sulfates, inorganic (plasma)	0.5—1.0	Nephritis	
Chlorides, calculated as NaCl (whole blood) (plasma)	450—500 550—620	Nephritis; cardiac conditions; prostatic obstruction; eclampsia; anemias; diarrhea	Fever; burns; pneumonia; Addison's disease; diabetes; vomiting; anaphylactic shock
Chlorides, calculated as Cl (whole blood) (plasma)	275—325 350—380		
Iodine, total ⁶ inorganic hormonal	8γ ⁷ 4γ 4γ	Varies with iodine content of diet Hyperthyroidism	Varies with iodine content of diet Hypothyroidism
Calcium (serum)	9—12	Hyperparathyroidism; gastric tetany; Paget's disease; polycythemia vera; multiple myeloma	Hypoparathyroidism, idiopathic and post-operative; infantile tetany; low calcium rickets; renal rickets; coeliac disease; non-tropical sprue; steatorrhea; nephrosis; hypoproteinemia; osteomalacia
Magnesium (serum)	1—3	Hyperparathyroidism	Hypoparathyroidism; infantile tetany
Sodium (plasma)	330	Hypercorticoadrenalism (in exceptional cases)	Addison's disease
Potassium (plasma)	16—22	Addison's disease; diabetes, uncontrolled; uremia, intestinal obstruction; acute infections	Hyperinsulinism; hypercorticoadrenalism (in exceptional cases); familial periodic paralysis

1. Values are expressed as mg. in 100 cc. of whole blood unless otherwise indicated.

2. Iodine number is the grams of iodine absorbed by 100 Gm. of fat.

3. Expressed as acetone.

4. One Kay unit of phosphatase per cc. is one of which 1 cc. will liberate 1 mg. of inorganic phosphate (expressed as P) from sodiumβ-glycerophosphate solution in 48 hr. at 38° and at a pH of 7.6.

5. One Bodansky unit of phosphatase is equivalent to 1 mg. of P liberated from a sodiumβ-glycerophosphate substrate as the P ion in 1 hr. at 37° and a pH of 8.6.

6. All iodine values determined by Dr. J. F. McClendon.

7. A microgram (γ) is a 0.001 mg.

TOTAL NONPROTEIN NITROGEN

The total nonprotein nitrogen of the blood consists of the nitrogen of urea, uric acid, creatinine, creatine, ammonia, amino acids and undetermined nitrogen which are partly exogenous and partly endogenous in origin. Nonprotein nitrogen increases above normal whenever the rate of production of its factors exceeds their rate of utilization and elimination. Its variation in the blood, therefore, normally parallels the nitrogen metabolism. Children normally have slightly lower values than adults. In renal insufficiency and in conditions associated with excessive tissue destruction the nonprotein nitrogen is

lent is one-thousandth of the equivalent weight in grams and is contained in 1 cc. of a normal solution. For example, the bivalent element, calcium, with a molecular weight of 40 has an equivalent weight of 20. Therefore, 1 milliequivalent (m. eq.) of calcium is equal to 20 milligrams (mgm.). One should always consider whether the value is for whole blood or plasma. Confusion is thus avoided for some constituents like chlorides and cholesterol which are unfortunately given sometimes for whole blood, otherwise for plasma. Plasma and serum contain practically the same amounts of the various constituents with the exception of fibrinogen which is present in plasma but not in serum.

elevated. To be of pathological importance the total nonprotein nitrogen should be above 40 mgm.

UREA NITROGEN

Urea is the chief end product of endogenous and exogenous protein metabolism in the body. Urea nitrogen normally forms about half of the nonprotein nitrogen of the blood. With nitrogen retention the proportion increases, sometimes to as much as 80 per cent. Elevation of the urea fraction ordinarily has the same diagnostic significance as increase in the total nonprotein nitrogen. Therefore, it is rarely necessary to order both determinations in the same specimen, except for the purpose of checking one against the other. Many clinicians prefer a urea nitrogen determination. Folin, however, considered a nonprotein nitrogen finding to be of more value. This is likewise the opinion of our own laboratory.

CREATININE

A knowledge of blood creatinine is important in studying renal diseases. Its concentration in the blood in health and in diseases other than those involving impairment of renal function is very constant. Nearly all other pathological conditions which affect the rest of the nitrogenous compounds of the blood have little influence upon it. Myers¹ has shown that in progressive loss of renal function the blood concentrations of uric acid, urea and creatinine increase in the order named. He believes that any considerable rise of the blood creatinine occurs only as the disease approaches a fatal termination. It is evident from this that determination of blood creatinine is not required, unless there is nitrogen retention, as indicated by an increase in the nonprotein nitrogen or the urea nitrogen. In chronic nephritis a creatinine value above 5 mg. per 100 cc. indicates an unfavorable prognosis. In milder cases of nephritis the urea concentration index is more useful than blood creatinine determinations. In acute nephritis and in acute mercuric chloride poisoning blood creatinine is of little prognostic value.

URIC ACID

Uric acid has been diagnostic of gout ever since Garrod's classical research. High values are also found in starvation, in conditions involving nitrogen retention and in diseases characterized by increased destruction of body protein. In the latter group the uric acid is derived from the nucleoprotein of the tissues as well as the purines in the diet.

TOTAL PLASMA PROTEINS

The total plasma proteins which are made up of albumin, globulin and fibrinogen, are decreased by a loss through the kidney, by prolonged use of a diet deficient in protein or by an inability on the part of the body to fabricate new protein. The deficit which results is usually in the albumin fraction and is accompanied by a tendency to edema. It is generally agreed that a reduction of albumin below 2.5 Gm. or a total protein below 5.5 Gm. per 100 cc. of plasma is likely to be followed by edema. There may be a reversal of the albumin globulin ratio due largely to an increase of the globulin frac-

tion. Newly born infants not unfrequently show hypoproteinemia.

LIPIDS OR FATS

Blood lipids are divided into three main groups: (a) true fats or triglycerides of the fatty acids; (b) phospholipids of which lecithin is an example and (c) sterols of which cholesterol is the most common representative found in blood. Hyperlipemia is encountered clinically when an excessive amount of fat is ingested or when the body is unable to utilize the fat absorbed, as in diabetes mellitus. The occurrence of lipemia in disease is caused by some functional disorder. Extensive liver disease is frequently accompanied by lipemia. Less is known about hyperlecithinemia and hypercholesterolemia but these changes tend to follow a rise in the neutral fat of the blood. Bloor has suggested that cholesterol aids in the transport of fatty acids. Although the various fractions of the lipids have been studied extensively in various clinical conditions, the results have yielded little of specific diagnostic value, except in thyroid disorders and lipoid nephrosis. In hypothyroidism hypercholesterolemia is practically the rule. In nephrosis all fractions of the blood lipids tend to be elevated in direct proportion to the severity of the symptoms.

GLUCOSE

The normal range for blood sugar varies with the method employed. The latest methods of Folin and Benedict give lower sugar values and are nearer the true glucose content of the blood. The non-fermentable or non-glucose reducing substances amount to about 8 mg. of glucose per 100 cc. of blood when one of these methods is used. Glucose determinations in blood are probably employed more than any other single blood analysis. It is of inestimable value as an aid in the diagnosis and treatment of diabetes mellitus. It is of paramount importance in the differentiation of true diabetes from simple glycosurias. It is likewise indispensable in the diagnosis of obscure cases of hypoglycemia.

For determining the true status of the carbohydrate metabolism there is no better clinical method than an alimentary glucose tolerance test. Recently Exton² has recommended a modified glucose tolerance test, which may replace the standard procedure now in use, because of its superior features. This "one-hour-two-dose" glucose tolerance test is based on the paradoxical law of Allen which is stated in the latter's words as follows: "Whereas in normal individuals the more sugar given the more is utilized, the reverse is true in diabetes." The test is simple and is economical of time both from the standpoint of the patient and that of the laboratory. It is more specific in character and, according to Exton, tends to diminish the number of equivocal results. In interpreting fasting blood sugar values it is well to recall that morphine, general anesthetics, amytal, drugs of the caffeine group and quinine raise the blood sugar. It is sometimes desirable to determine glucose in the cerebrospinal fluid. Since spinal fluid is a dialysate of blood serum, sugar changes in blood will be reflected in it. The determination of the cerebrospinal fluid glucose without

knowledge of the blood sugar level at the time is not of great value. Ordinarily the sugar of the spinal fluid is slightly lower than that of the blood.

ICTERIC INDEX

The icteric index is a procedure of distinct value in estimating the bilirubin in the blood serum. As a measure of the functional activity of the liver it is useful as an aid in the diagnosis of cirrhosis and malignancy of the liver; in the detection of cholelithiasis and cholecystitis without clinical jaundice; and in obstructive jaundice differentiating between malignancy and acute catarrhal jaundice, by indicating whether the jaundice is increasing. As low or normal values are found in non-hemolytic anemia, it is of importance in the differential diagnosis of the anemias. During the administration of arsenicals an increased icteric index may be the earliest indication of hepatic damage. The Van den Bergh reaction gives added information regarding bilirubin in the blood in some cases. It helps to differentiate between obstructive and non-obstructive forms of jaundice.

PHOSPHATASE

Phosphatase is an enzyme found in blood, muscle, actively growing bone and cartilage, renal and intestinal tissue and in small amounts in other organs. It liberates inorganic phosphorus from organic phosphorus compounds. The enzyme occurs in increased amounts in the plasma of patients with certain disturbances of calcification. Although up to the present time determination of phosphatase has not been extensively used as a clinical aid, it promises to be employed for this purpose more frequently in the future.

ACID-BASE BALANCE

Under physiological conditions the acid-base balance of the blood is maintained by a combination of the processes of neutralization and excretion. Deviations of the pH from the normal occur only as a result of extremely severe disturbances of the body's mechanisms for preserving physiological constancy of the acid-base balance. It is usually not necessary to determine the pH of the blood for diagnostic purposes but it is essential to understand the mechanism by which acid-base balance is maintained, if one wishes to understand and treat conditions of acidosis and alkalosis. The maintenance of a normal pH depends on the maintenance of a balance between alkaline bicarbonate BHCO_3 and the acid H_2CO_3 . If both increase in the same ratio no change in the pH occurs. A rise in H_2CO_3 , the BHCO_3 remaining the same, causes a fall in pH and an uncompensated acidosis occurs. If the H_2CO_3 drops in proportion to the base bicarbonate we have a compensated acidosis with no change in pH. A rise in BHCO_3 , while H_2CO_3 remains the same, produces an uncompensated alkalosis. In cases of uncompensated acidosis and alkalosis, a pH determination is essential to correctly evaluate the acid-base balance. The simplest and best method of obtaining information concerning the acid-base balance is a determination of the carbon dioxide combining power which is a measure of the alkaline reserve and an index of acidosis or alkalosis. Low

values are present in all diseases associated with acidosis, high ones in alkalosis. Figures for the infant tend to be somewhat lower than those for the adult. Normally the acids of the blood balance the bases as expressed by the following equation: Total bases ($\text{Na} + \text{K} + \text{Ca} + \text{Mg}$) = total acids ($\text{Cl} + \text{HCO}_3 + \text{PO}_4 + \text{protein} + \text{SO}_4$ and organic anions). The average normal values for these are as follows: Na, 142; K, 5; Ca, 5; Mg, 3; Cl, 103; HCO_3 , 28; PO_4 , 2; protein, 16; SO_4 and organic acid, 6 milliequivalents per liter.

SODIUM AND POTASSIUM

Sodium of the blood is practically all in the plasma, while nearly all of the potassium is in the cells. Variations in sodium values alone are not especially diagnostic of any clinical condition. However, in Addison's disease, plasma sodium tends to be decreased and in exceptional cases of hypercorticoadrenalism, it is increased. With the decrease in sodium in adrenal insufficiency there is a corresponding increase in plasma potassium. This disturbance in the electrolyte pattern is usually corrected by the administration of adrenal cortical extracts or by a low potassium, high sodium intake. In cases of familial periodic paralysis the serum potassium is characteristically lowered. It can be increased, however, by the administration of potassium salts with complete alleviation of all symptoms.

CALCIUM AND PHOSPHORUS

Nearly all of the calcium of the blood is present in the serum. Between 40 and 60 per cent is in the freely diffusible state, while the remainder is combined, chiefly with proteins. In conditions in which the serum proteins are lowered, the non-diffusible fraction is correspondingly decreased, giving a low total calcium, as in some cases of nephrosis. In multiple myelosis, on the other hand, both the protein and the calcium are increased. A portion of the diffusible calcium exists in the ionized form. McLean³ has devised a chart from which the calcium ions can be estimated if the total calcium and total serum proteins are known. Peters and Van Slyke⁴ believe that our knowledge of the significance of serum calcium in clinical disease might be measurably advanced, if it became more common practice to determine inorganic phosphorus and protein together with calcium. It is important to follow the blood calcium of patients who are receiving parathyroid extract in order to prevent overdosage.

The determination of serum calcium without inorganic phosphorus is of little value. In rickets the two values assist in diagnosing the condition as indicated in the table. Repeated determinations indicate the value of the therapy employed. The diagnosis of parathyroid disorders is aided by a consideration of calcium and phosphorus findings. Hypoparathyroidism results in hypocalcemia and hyperphosphatemia, whereas hyperparathyroidism (osteitis fibrosa cystica) produces changes in the opposite direction. In renal disorders increased serum phosphorus is an unfavorable prognostic sign.

VITAMIN C

In certain clinical conditions the estimation of reduced vitamin C in the blood by chemical analysis is desirable. The average normal value for vitamin C in the blood plasma is 0.8 mg. or above in 100 cc. In the prescurvitic state the range is said to be between 0.8 and 0.6 mg. in 100 cc., while in active scurvy it falls below 0.5 mg. in 100 cc.

The results of chemical blood analyses are of significance only when properly interpreted in conjunction with the results of clinical examinations. The result of a single determination should be confirmed by additional tests whenever a discrepancy between this and the clinical findings is encountered.

Certain miscellaneous blood analyses, such as the determination of lead for confirmation of a diagnosis of lead poisoning, are at times of very great value in obscure cases. Likewise the determination of the level of sulfanilamide in the blood from time to time during the course of active sulfanilamide therapy serves as a reliable guide to dosage.

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Foreign Body (Bobbie Pin) in Duodenum

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IT has been said that in children, almost any foreign body which passes the narrow part of the esophagus, opposite the cricoid cartilage, will sooner or later pass by rectum.¹ As an every day working principle, this holds true. There are occasional exceptions, however, such as the sharp pointed pin, open safety pin or long narrow objects which have difficulty, especially in traversing the duodenum.

Time does not change the habits of small children of putting almost any object in their mouths. Time does change the variety of small objects about the home. The dime store and the dictates of fashion continuously supply new objects to be swallowed and create new problems for the physician and surgeon. The bobbie pin, a sort of modified hair pin, can be found in almost any home at the present time, and it is but natural that a few of them are going to be swallowed by small tots. One would suppose that so small and slender an object would easily pass the alimentary tract. That such is not the case is illustrated by the following case history.

CASE REPORT

C. R. O., girl age 2½ years, and rather small for her age, was brought into the office by her mother June 13, 1938. The mother stated that the child insisted she swallowed a bobbie pin and that it stuck in her throat. With this history, the entire alimentary tract was X-rayed and the pin located in the stomach. The child was apparently in no discomfort and so rather free assurance was given the parents that the pin would probably pass the natural way. Directions were given to give the child bulky foods in order to facilitate its passage.

On June 17, 1938, X-rays showed the pin in a horizontal position apparently in the duodenum. The child now had become rather cross and irritable and would not eat well. On June 20 the position had shifted to an oblique angle in a position corresponding to the fourth part of the duodenum. On June 23, another X-ray was taken immediately following the giving of a tablespoonful of barium mixture. This clearly

showed that the pin had slid back into the retroperitoneal portion of the duodenum and that the distal portion of the pin was the round folded end. Further X-rays daily showed the pin in the fourth part of the duodenum where it remained in position, as shown in figure 1. By this time the child was very cross and irritable, complained of pain in the upper abdomen and would not eat.

On June 25, operation was advised and done under gas ether anesthesia. An upper right rectus incision was made and the abdomen opened. The transverse colon and omentum was lifted up and the bobbie pin was palpated pointing through the duodenal jejunal angle. An attempt was made to manipulate the pin into the jejunum in a position more favorable for removal. This could not be done. It was noted that there was considerable redness of the peritoneal covering of the duodenum and first part of the jejunum and we were afraid to use any but the most gentle manipulations. We then succeeded in fixing the pin by applying lightly a rubber clamp and massaging the jejunum back over the distal portion of the pin. After packing off the field carefully, we made a small incision in the jejunum, about one inch from the duodenal jejunal angle, and removed the pin.

The opening in the bowel was closed by two rows of Lambert sutures, using a small intestinal needle. There was no soiling of the peritoneum. The abdominal wall was closed, without drainage, using No. 0 plain for peritoneum, No. 1 chromic for fascia and two retention sutures and dermol for the skin. The pin measured 5 cm. (2 inches) in length and .5 cm. (3/16 inch) in width at the widest or folded end.

Convalescence was relatively uneventful except that on the fourth day the child got out of bed while unattended and broke open the wound. It was necessary to resuture the entire abdominal wall. Recovery took place without herniation.

There are anatomical reasons why long slender objects are apt to be held up in the duodenum. The major portion of the duodenum is retroperitoneal and relatively immobile. This retroperitoneal portion can be likened to a rigid tunnel with a flexible tube, the stomach and first part of the duodenum as the entrance, and another flexible tube, jejunum, as the exit. It is obvious that long objects can be so manipulated by peristaltic action

as to be pushed into the duodenum. The exit from the duodenum, however, may be impeded by the rather acute bend formed by the duodenal jejunal angle. This angle is further accentuated by the suspensory muscle of the duodenum (Treitz), which is described as a band of involuntary muscle fibres running from the left pillar of the diaphragm to the angle. It is obvious that a long object would have difficulty in negotiating this curve because of the immobility of the retroperitoneal portion of the duodenum. Another anatomical factor which plays a part is the nature of the rugae in the duodenum and first part of the jejunum. Here the rugae are deep and run transversely across the bowel and allow the distal point of the object to be caught in these deep folds, further impeding its progress.

That long slender objects are often held up in the duodenum, especially in children, is further proven by studying the literature on foreign bodies in the duodenum. The following references are cited:

An infant, age 4 months, swallowed a bar pin which was removed from the duodenum.² Arrigoni reports a nail removed from the duodenum in a child, age 15 months.³ Feriz reports a glass eye from a teddy bear with a long pin attached, incarcerated in the duodenum.⁴ Simon tells of removing a coffee spoon from the duodenum.⁵ There is a report by Fieschi of removing a needle from the duodenum of a child, age 3 months.⁶ Also, there is a report by Chaton of a metal hair barrette removed from the fourth part of the duodenum.⁷ Rivarola reports two cases of removal of nails from the duodenum in children.⁸ Raymond reports the removal of a bobbie pin from the duodenum in a girl, age 14 months.⁹ In this case, the pin became caught in the first part of the duodenum and was removed by an abdominal incision, pushing the pin back into the stomach and without opening the stomach, threading the pin into a catheter and withdrawing it through the mouth. Greeley reports two cases of slender objects removed from the stomach and duodenum by a similar procedure.¹⁰ Henrard reports the surgical removal of a pin in the duodenum in an infant, age 5 months.¹¹

In all these references it will be noted the object removed was long and slender.

CONCLUSIONS

In children, when the objects swallowed are long and slender, such as nails, bobbie pins, hair pins, bar pins, etc., we cannot be too free with our assurances that the object will be passed the natural way. It has been shown



Fig. 1. Roentgenogram showing bobbie pin in fourth part of duodenum in a child 2½ years old.

that anatomical reasons favor the incarceration of such objects in the first or fourth part of the duodenum where removal is difficult. It follows then that it might be wise to remove such objects while they are in the stomach either by gastrostomy, by the esophagoscope, or by the catheter method—procedures that are safer and more simple than duodenostomy.

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Chronic Idiopathic Xanthomatosis of the Hand-Schüller-Christian Type*

With Special Reference to the Oral Manifestations

Report of Three Cases

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HAND-SCHÜLLER-CHRISTIAN'S syndrome belongs to the group of idiopathic xanthomatosis characterized by the local deposition of lipids in the various tissues of the body. The lipids so deposited are essentially the same type as found normally in the body. The etiology of the disease is not known. It has been considered as a metabolic disturbance in which cholesterol and its esters are abnormally produced and deposited, by some physical colloid mechanism, into the reticulo-endothelial cells and other tissues. Lichty¹ and Cowie and Magee² found cholesterol to be the predominating lipid in the xanthomatous deposits, comprising 50 per cent of the total lipid content. Histologically, the yellowish masses are composed of lipid-laden histiocytes or "foam" cells. These "foam" cell masses then undergo fibrosis and granulomatous tumor formations occur. In the fully developed form of the disease, these tumor formations produce striking bony defects, which may appear in any part of the skeleton, but are particularly prone to localize in the membranous bones of the skull. These lesions are destructive and as they expand, give rise to pressure symptoms. The syndrome is most commonly characterized by exophthalmos, diabetes insipidus, and occasionally by dwarfism or acromegaly, hypogonadism or dystrophia adiposo-genitalis, and a cachexia of pituitary origin.

Although the Hand-Schüller-Christian syndrome has been reported in adults, it is characteristically a disease of childhood. It occurs in a sex distribution ratio of 3:2 in favor of males.

While it is well known that a marked gingivitis is a common symptom of the disease, comparatively few reports have discussed the various other oral manifestations of the syndrome. In 1905, Kay³ reported separation of the gums from the teeth followed by a gradual loss of the latter, starting with the molars. Griffith⁴ commented on the marked irregularity of the teeth. The patient described by Thompson, Keegan, and Dunn⁵ developed a severe gingivitis followed by resorption of the alveolar process which caused many teeth to become loose. Chester and Kugel⁶ reported a 28-year-old male who lost all of the teeth on one side of the maxilla and several from the mandible. Another adult, a 23-year-old female, developed pain in a tooth, stomatitis, and looseness of teeth, following which multiple areas of decalcification were found in the mandible.⁷ Hankey⁸ reported a male who at the age of 33 years first developed looseness of

his teeth. The condition was diagnosed as periodontoclasia and the teeth were extracted. Three years later, the patient's denture would not fit because of an enlargement of the mandible. There were no other systemic disturbances. Roentgenograms showed a diffuse rarefaction throughout the body of the mandible. The tissue removed by biopsy revealed a granulomatous growth resembling that of xanthomatosis. It was then learned that the patient had had polydipsia and polyuria of five years duration. There was clinical improvement following the use of radium and pitressin. In a series of 124 patients, Dauksys⁹ noted gingivitis with loosening of teeth and exfoliation in 23, or 18 per cent. A number of other observers have made reference to the occurrence of intractable gingivitis, looseness, and exfoliation of the teeth as a result of xanthomatous destruction of the alveolar processes.^{10,11,12,13,14,15,16,17}

The oral manifestations in the Hand-Schüller-Christian syndrome seem of sufficient interest, therefore, to warrant the reporting of three patients studied at the University of Minnesota Hospital.

CASE REPORTS

Case 1. D. L., a female aged 7, was first admitted to the University of Minnesota Hospital in 1930 because of exophthalmos, loss of vision, and malnutrition. The exophthalmos, together with a moderate enlargement of the head, were noticed during the first few months of life. On admission, physical examination revealed a hydrocephalic head with a tendency towards scaphocephaly. There was a palpable defect in the occipital area of the skull. A bilateral buphthalmos existed together with an opaque cornea, injected sclera, and photophobia. The teeth were poorly formed and maloccluded with an anterior open bite. Several large, brown nodules were present in the skin over the lower back, abdomen, and buttocks. Laboratory examinations of urine and blood were negative. The blood, Wassermann and Mantoux tests were negative. The serum cholesterol of 197 mg. per cent was within normal range. Roentgenographic examination showed multiple defects in the skull suggestive of xanthomatosis.

In 1933, the patient was readmitted because of pain in the right eye. Examination at this time revealed the bony defects described above and an increased number of nodular pigmented areas of the skin over the trunk and extremities. The oral examination disclosed a moderate gingivitis. The serum cholesterol (166 mg. per cent) and the total fatty acids (337 mg. per cent) were within the normal range; while the value for lecithin (102 mg. per cent) was slightly below normal. A glaucoma had developed in the right eye and the intra-ocular tension was reduced by operation. Further roentgenographic examination did not show any extension of the defects in the skull and no similar defects in the long bones. Because of the marked loss of vision, the patient was discharged to a state institution for the blind.

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Fig. 1. D. L., aged 7 years. Photograph demonstrating buphthalmos.



Fig. 2. D. L. Lateral skull roentgenogram taken November 21, 1930. Arrow points to defect in the occiput.

Case 2. G. S., a male aged 4 years 10 months, was first admitted to the University of Minnesota Hospital in October, 1932. His parents first noted exophthalmos of the right eye when the boy was 2 years 9 months of age. Two months later a physician was consulted because the exophthalmos had become bilateral and numerous soft tumors were palpable over the scalp. Roentgenographic examination showed multiple irregular areas of rarefaction throughout the entire skull. There was no involvement of any other bones. Biopsy of one of the scalp nodules was diagnosed as multiple myeloma by one pathologist. Laboratory examinations revealed no abnormalities of the blood or urine. The Bence-Jones protein was never demonstrated. Blood cholesterol values were within normal range. The physician, however, felt that this patient belonged to the Schüller-

Christian syndrome and instituted a series of roentgen ray therapy. This treatment apparently caused the soft masses in the scalp to disappear and stimulated repair of the bony defects.

One year later, the patient was again examined by his physician at which time the bilateral exophthalmos had become marked and areas of rarefaction were present in the ribs, pelvis, and femora, as well as in the skull. Another series of roentgen ray therapy was given. This was again followed by bone regeneration. In June, 1932, gingivitis and loosening of the teeth were first noted. There was no history of polydipsia and polyuria at any time.

At the time of the patient's admission to the University Hospital, there was a marked bilateral exophthalmos. Roentgenograms of the mouth showed normal development of the permanent teeth but there was a considerable amount of destruction



Fig. 3. G. S. Photograph taken October 7, 1932, when the patient was 4 years 10 months. Note the marked exophthalmos. This condition was bilateral.

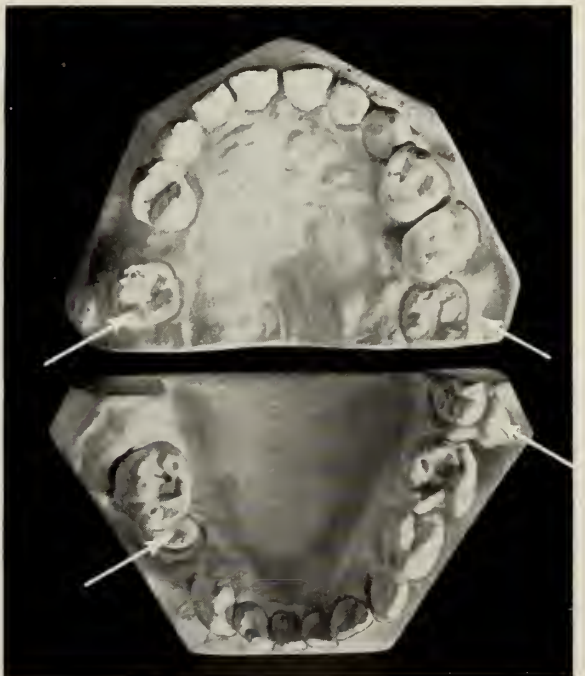


Fig. 4. G. S. Dental cast, Oct. 17, 1932. Arrows point to erupted upper right, upper left and lower left first permanent molars and right permanent bicuspid. Note shrinkage in molar area.



Fig. 5. G. S. Lateral skull roentgenogram taken October 8, 1932. Arrows point to defects in the skull. The lateral margins of the orbit, the sphenoid bone and the vault are all involved.

of the bony tissue in the molar region. Three of the first permanent molar teeth and the lower right first bicuspid tooth had erupted. The molars were loosened and the surrounding gum tissue was eroded. Superimposed upon this oral condition was a Vincent's infection which was intractable to extensive local treatment with chromic acid and hydrogen peroxide solutions. Neo-salvarsan was also given intravenously. However, no definite improvement was observed until the molar teeth were extracted. After the latter procedure, there was a marked change for the better.

Laboratory examinations, including blood, Wassermann and Mantoux tests, were entirely negative. Multiple areas of rarefaction were visible in the roentgenograms of the skull, right



Fig. 6. G. S. Roentgenogram of pelvis taken October 12, 1932. Arrows point to destructive lesions in right ilium, left pubes, and the femora.

clavicle, right humerus, right ilium, and left femur. There was also evidence of a pathological fracture of the right clavicle which had united with new bone formation.

On second admission in October, 1934, the patient still showed bilateral exophthalmos. However, the roentgenograms showed improvement, as the areas of rarefaction were less marked in the skull and long bones.

Re-examination in November, 1936, July, 1938, and December, 1938, gave no roentgenographic evidence of bone pathology. The skull, femora, pelvis, and ribs all appeared normal. Similar improvement was noted in the bone structure of the mandible and maxilla. The gingival tissues were in good condition. Malocclusion developed due to premature loss of deciduous and permanent teeth. The exophthalmos was scarcely noticeable.

Case 3. J. M., a male aged 1 year 11 months, was admitted to the Pediatric Service of the University of Minnesota Hospital in June, 1935. He had had polydipsia and polyuria of four months duration and at the time of admission, painful eruption of four deciduous teeth. There had been no previous illnesses except for chronic seborrhea which had persisted throughout infancy, and an attack of tonsillitis with bilateral otitis media at the age of 1 year 6 months.

Physical examination revealed an undernourished child weighing 10.5 kilograms. Seborrheic lesions were present over the head, scalp, and neck, with chafing around the external genitalia. Both auditory canals were filled with dried, grayish crusts. A mass was palpable posterior to the right ear. The cervical lymph nodes were slightly enlarged. Four deciduous teeth were erupting. Laboratory examinations demonstrated urine of low specific gravity without sugar, albumin, or acetone throughout the 11 months period of hospitalization. The blood had a hemoglobin content of 66 per cent. There were 3,370,000 erythrocytes and 7,150 leucocytes per cu. mm. Of the latter, 88 per cent were polymorphonuclears and 12 per cent were lymphocytes. The blood, Wassermann and Mantoux tests were negative. The values for serum cholesterol (238.7 mg. per cent) and total fatty acids (520.8 mg. per cent) were slightly above normal limits. The other lipid figures were as follows: lecithin, 244.5 mg.; cholesterol esters, 150 mg.; and free cholesterol, 88 mg. per cent. Roentgenographic examinations showed sclerosis and some areas of rarefaction involving both mastoid regions, and multiple areas of destruction in the skull and mandible. At no time could similar pathology be found in any of the long bones.

At the time of admission, the patient had marked polydipsia and polyuria with a fluid output of 5 to 6 liters per day. Dur-



Fig. 9. G. S. Roentgenogram of pelvis taken November 6, 1936. Regeneration of bone has occurred in the areas formerly destroyed.



Fig. 7. G. S. Photograph taken November 9, 1936, at the age of 8 years 11 months. The exophthalmos disappeared following several courses of roentgen ray therapy.



Fig. 8. G. S. Lateral skull roentgenogram taken November 6, 1936. There is no evidence of bone pathology.

ing periods of pitressin administration, the output was decreased to between 1 and 2 liters per day. Although the specific gravity of the urine did occasionally reach 1.020, the average level was below 1.005. Except for an occasional rise in temperature, the patient was afebrile up to the time of his terminal illness. During the last six months, he gradually developed bilateral exophthalmos.

A striking oral condition existed in this two-year-old patient, for the dental cast showed a tooth erupted in the position of the upper right first permanent molar. This appears to be confirmed by the lateral roentgenogram of the skull. The crown of the tooth was formed but there was only slight development of the roots. Throughout the period of hospitalization, the patient had periods of exacerbations and remissions of the seborrheic dermatitis. During an exacerbation, the oral tissues were swollen, reddened, and were covered with a white film which was easily removed. Since debris readily collected around the necks of the teeth, the clinical picture superficially resembled a Vincent's infection. Unfortunately, bacteriological examinations were not made. Despite continued oral treatment, the gingiva never appeared normal.

The patient died in May, 1936, 11 months after admission. At postmortem examination, the pituitary gland was found to be completely surrounded, but not invaded, by fat-laden cells. Similar cells formed a small tumor mass within the third ventricle, but the roof of the ventricle was intact. Fat-laden cells were also deposited in the retrobulbar tissues and in the thymus gland.

These three case histories illustrate some of the manifestations of chronic idiopathic xanthomatosis. The first patient demonstrated xanthomatous infiltrations of the skin. The outstanding feature of the second patient was the multiple skeletal defects and the marked exophthalmos, both of which disappeared following several courses of roentgen ray therapy. The third patient presented the classical triad: exophthalmos, diabetes insipidus, and multiple defects in the membranous bones of the skull. However, all of the patients were similar in giving an early history and clinical findings of gingivitis and looseness of the teeth. Possibly the premature eruption of permanent teeth in the last two patients was the result of alveolar resorption hastening the physiological process.

The mechanism of the disturbed water balance as illustrated by the third patient is subject to speculation.

In the normal water metabolism of the body, the diuretic and antidiuretic hormones are balanced. In experimental work with dogs suffering from diabetes insipidus, Bourquin¹⁸ obtained a diuretic principle from the corpora mammillaria. The same substance was found in the blood and urine of the experimental dog but not in normal animals. However, these findings have not been confirmed by other investigators. Both the pars intermedia and the posterior lobe of the pituitary gland are considered to be under central nervous system control through fibers originating in the nucleus supraopticus and nucleus paraventricularis. Polyuria may be caused



Fig. 10. G. S. Photograph of dental cast taken November 10, 1936. Note the early loss of all deciduous teeth and the permanent molar and bicuspid teeth which had erupted prematurely.



Fig. 11. J. M. Photograph showing exophthalmos and seborrheic lesions of the skin.

by injury to either these fiber tracts or their central nuclei. However, detailed postmortem examination of patient, J. M., showed the pituitary gland to be completely surrounded by masses composed of "foam" cells. The gland was not invaded by these cells. There was a xanthomatous formation also within the wall of the third ventricle. The cells of the hypothalamic and basal nuclei appeared intact. There was one small hemorrhage in the region of the right nucleus supraopticus and another hemorrhage within the substantia grisea centralis on the left side. The retrobulbar tissues were invaded by the xanthomatous cells. Therefore, it seems probable that

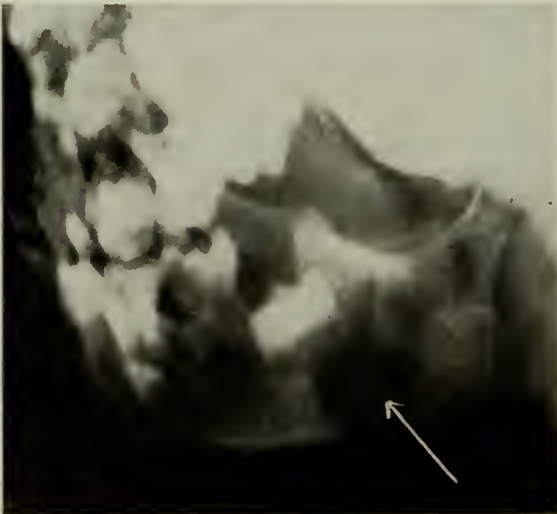


Fig. 13. J. M. Roengenogram of jaw taken September 10, 1935. Arrow points to the defect in the mandible.

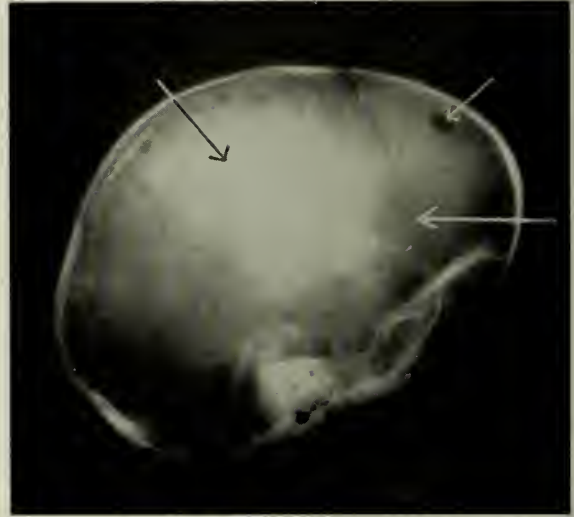


Fig. 12. J. M. Lateral skull roentgenogram taken June 15, 1935. Arrows point to defects in the calvarium. The sella turcica is normal. One of the upper first permanent molar teeth appears to be erupted.

both the diabetes insipidus and exophthalmos in this patient were caused by pressure of the granulomatous cell masses.

SUMMARY AND CONCLUSIONS

Three case histories of patients suffering from chronic idiopathic xanthomatosis of the Hand-Schüller-Christian type are presented. The clinical recovery of G. S. following extensive roentgen ray therapy is most unusual. In this patient there was a marked improvement of the exophthalmos and a complete disappearance of the multiple bony defects that had lasted longer than two years. The last patient reported, J. M., did not show any improvement following similar therapy. Possibly the xan-

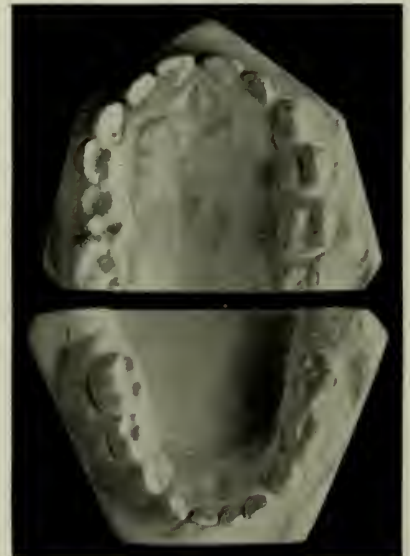


Fig. 14. J. M. Photograph of dental cast showing an erupted upper right first permanent molar tooth.

thomatous masses found on postmortem examination surrounding the pituitary gland and in the wall of the third ventricle were too deep-seated to be reached by radiation. It is believed that the location of these granulomatous masses was responsible for the development of both the diabetes insipidus and exophthalmos.

Special reference is made to the oral pathology observed in these children. All three of the patients presented a gingivitis. There was also looseness of teeth and premature eruption of several permanent teeth in the last two patients. The occurrence of an otherwise unexplained gingivitis, loosening of teeth or premature eruption of teeth should call attention of both the dentist and the physician to the possible existence of an essential xanthomatosis.

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A Study of Infant Mortality in Montana

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IN any nation where the birth rate is declining, the importance of reducing to the minimum the number of infant deaths becomes very great. Also in any nation where the general problem of economics is acute, the reduction of infant morbidity to its minimum is a necessity. No one can accurately measure the human misery and suffering, or the economic loss, caused by prenatal, neonatal and infantile mishaps or diseases. There is no other problem with as great a challenge to so many physicians, because the great majority of infants are, and probably will continue to be, ushered into the world by the general practitioner.

The medical problem concerning the physical well-being of infants in Montana is reasonably typical of the Northern half of that large section of the United States lying between the Mississippi river and the Rocky Mountains. It is a sparsely populated state, yet the great majority of its people are ordinarily within two hours driving time from a hospital, and half that distance from a physician. In 1937, 95.7 per cent of rural and 99.8 per cent of urban deliveries were attended by physicians, and 62.4 per cent of all births were in hospitals.

†Great Falls Clinic, Great Falls, Montana.

In their reports of 10,000 cases of pregnancy, Holt of Johns Hopkins reported a neonatal mortality rate of 3.1 per cent and Swanson of the Chicago Lying-In reported a rate of 2.6 per cent. In 1936, statistically an average year, 10,400 births were reported in Montana with a rate of 3.05 per cent. In 1937, there were 10,248 live births with a neonatal mortality rate of 2.8 per cent. The neonatal mortality in 1937 constituted 56.2 per cent of the infant mortality. The urban neonatal death rate was 2.4 per cent. Seventy-nine per cent of the neonatal deaths in Montana (U. S. 81 per cent) were classed as due to prematurity, injury, congenital malformation, or other prenatal and natal conditions. For 1938, the provisional figures for 10,715 live births indicate a neonatal rate of 2.6 per cent, or 60 per cent of the total infant mortality. The infant mortality rate in Montana during 1936 was the same as for the entire registration area of the United States for that year, 57 per 1,000 live births. In 1937, the rate was 50.5, and for the United States, 54.4. The provisional infant mortality rate in Montana for the year of 1938 was 44.7.

Some statistics from the United States Bureau of the Census for 1936 are both interesting and instructive. The urban infant mortality rate for Montana was 46,

for the United States 55. Six states—Minnesota, Oregon, South Dakota, Washington, Connecticut and New Jersey—have a lower urban death rate under the age of one year. The Montana urban infant mortality rate declined from 78 in 1922 to 46 in 1936. The rural infant mortality rate has been less satisfactory, its rate being 62 (U. S. 58). Twenty-eight states had a lower rural infant mortality rate than Montana. The year 1933 was the best on record for Montana, the rate being 42 for the urban and 55 for the rural communities. This has apparently been bettered in 1938. The economic distress so prevalent the last several years was responsible, in my opinion, for the increased mortality rates in 1934, 1935 and 1936. Just what other factors play a part is not known. Certainly, the great increase in the number of infants born to primiparous, as compared to multiparous, mothers is remarkable. In 1936, the number of infant deaths up to one year of age in urban areas was 25 per cent of the total, while the percentage of urban births was 31.4 per cent. Conversely, with 68.4 per cent of the births, the rural areas of Montana contributed 75 per cent of the infant deaths. In 1937, the urban areas contributed 34 per cent of the births and 29 per cent of the deaths, the rural areas with 66 per cent of the births had 71 per cent of the infant deaths.

In comparing some statistics from various counties of Montana, I wish to give the following totals for the years 1933 to 1937 inclusive.

County	Total Live Births	Infant Mortality Rate per M
Cascade	4,071	41
Yellowstone	3,872	64
Silver Bow	3,700	42
Valley	2,474	60
Missoula	2,363	39
Flathead	2,114	53

These figures bring up several questions:

1. Why should the infant mortality rate in Yellowstone county be 64 per 1,000 live births as compared with 42 in Silver Bow, which has only 172 less births, or Cascade county with a rate of 41 and 169 more births?

2. In Valley county in 1937 there were 20 infant deaths in 611 live births as compared to 40 infant deaths in 563 live births in 1935! How can this improvement be explained?

3. Why does Flathead county with 2,114 live births have an infant mortality rate of 53 as compared to Missoula county which has 2,363 live births and a rate of 39?

4. What factors operate to cause a relatively low rate in Silver Bow county?

In attempting to analyze these figures, it is reasonable to state that with the possible exception of Silver Bow county, there is no essential racial or sociologic difference in the population of the various counties. The first and fourth questions cannot be answered at this time. Careful studies of infant mortality carried on preferably through the county medical societies would probably reveal the answers to these questions. In my opinion, the marked improvement in the rate in Valley county is directly attributable to the splendid work of the nursing

set-up instituted there in 1936 by the division of Child Welfare of the Montana State Board of Health. I think the reason Flathead county has a 25 per cent higher infant mortality rate than does Missoula county is because in Flathead county there is absolutely no public nursing service of any kind available. There are possibly other factors that play a minor part in the marked differences in the infant mortality rates, but I am sure a good public health nursing service saves some infant lives.

Any discussion of infant mortality would be much more authoritative, and any attempt to lower the infant mortality rate would be simplified if more careful studies were made in all cases and more postmortem examinations performed in the fatal cases. That it is not impossible to secure autopsies is shown by the reports from the Chicago Board of Health where the number of satisfactory necropsies in neonatal deaths increased from 35 per cent in 1936 up to 83.5 per cent in the first five months of 1938.¹ In about one-third of these cases, autopsy did not reveal the cause of neonatal death. Intracranial hemorrhage (22 per cent) and congenital malformation (15 per cent), were the most frequent causes of death. Pneumonia (8 per cent) and asphyxia (6 per cent), were also frequent causes in the Chicago statistics. An interesting point here is that according to the death certificates, only 13 per cent of the neonatal deaths in Montana in 1937 were recorded as due to birth injury or intracranial hemorrhage, as compared to 22 per cent in the Chicago study. In any attempt to lower infant mortality, it must be remembered that over one-half of all infants dying in the first year of life, die during the first two weeks, and three-fourths of these deaths are due to prematurity, injury, or other prenatal and natal conditions. In Montana in 1937, 26 per cent of the infant deaths occurred before the babe was one day old. This unquestionably implies that the obstetrical care is the greatest factor in the reduction of neonatal mortality. It has been stated that "the desirable attendant for the pregnant woman is a physician adequately trained and experienced, and so aware of his limitations that, when emergencies arise which are beyond his competence, he will not delay in securing help."² Prematurity is the basic reason for the death of many more newborn infants than is any other cause. The treatment is both prenatal and postnatal. No one can question Litzenberg's statement that "prenatal care should begin before marriage."³ Many have emphasized the great need of care early in pregnancy.⁴ In his studies on neonatal mortality⁵ and on the reduction of premature infant mortality,⁶ Clifford has well stated that obstetricians should seek to improve the infant's condition at birth by the more conservative and intelligent use of analgesics and anesthetics during labor, the selection of the best possible method of delivering the infant, and the better treatment of toxemias of pregnancy. I wish to repeat again that good obstetrical management of the mother is practically always good treatment for the babe. The most frequent neonatal causes of death, prematurity and accidents of labor, are connected with the obstetrical management. In the majority of cases, the actual gesta-

tional age of the infant, rather than the birth weight, determines the survival rate. I think the famous Dionne quintuplets bear out this statement. In practice, the gestational age and birth weight are usually closely associated. If by proper care of the mother the duration of pregnancy can be lengthened only a relatively short time, the greater will be the survival rate of newborn infants.

In the neonatal handling of premature infants, Hess has led the way.⁷ Doctor Hess in his many articles has shown the value of the so-called "premature infant stations" in saving the lives of premature infants. With our modern, rapid methods of communication and transportation, even in the sparsely inhabited state of Montana, the establishment of several of these stations should result in the saving of a considerable number of lives yearly. The small portable incubator, with a thoroughly trained nurse to accompany it when sent after a babe, and the hospital "set-up" under competent medical supervisors can easily be procured at a relatively small expense in several of the larger cities in Montana, and I feel that the various medical, public health, and welfare organizations should join in this infant-life-saving program. The establishment of these stations in hospitals having a considerable number of obstetrical cases is preferable, for the procuring of breast milk for these premature babes is a highly desirable, many times a life-saving procedure.

In the actual care of a premature infant, I would emphasize the necessity of meticulous care in the following respects:

A. *Personnel and Equipment.* The greatest need of all in the treatment of premature infants are nurses who have received adequate specialized training in the care of prematures, and who realize and accept their great responsibility for the treatment of these infants. The medical care should be in charge of a physician interested in saving these small humans, and cognizant of their needs and methods of supplying these needs. The equipment may be very simple, but it is very important that there be some method for the reasonably close regulation of temperature and humidity.

B. *Isolation.* Premature infants are notoriously subject to any and all types of infection, and even a minor infection may bring a fatal ending. Cubicles or separate rooms are an essential. No one should be allowed to come in contact with the infant except the physician and the nurse. The physician and the nurse must be free from any respiratory, gastro-enteric, or dermal infection. Both must be conscientious, and have an intelligent conception of asepsis and cleanliness. All clothing, bedding, and utensils must be absolutely individual to the patient alone.

C. *Food.* Breast milk should be provided if possible. If this is not available, a simple, well considered formula with which the physician is familiar should be provided. My preference is for a not too dilute boiled cow's milk to which is added lactic acid and dextrin-maltose. Frequent feedings of small amount are usually necessary, often only a dram every fifteen to thirty minutes. Ordinarily these can be given by dropper, sometimes by means of a Breck feeder. Rarely in my experience do I

find it necessary to feed by gavage. It usually helps in feeding these infants, and also in having them retain their food, to keep the head of the crib constantly elevated five or six inches.

D. *Water.* Dehydration rarely is so pronounced in these infants that it necessitates the giving of intravenous, intraperitoneal, or subcutaneous fluids. In a viable infant, a good nurse can almost always supply the water need of the infant with a medicine dropper.

E. *Quiet.* The less these babes can be handled, the better. Too much nursing care may be as disastrous as is too little care.

All infant mortality rates, and especially neonatal rates, vary closely with the premature birth rates. Every physician should have at call assistance in their care. The success of the Hess method in Chicago warrants its trial elsewhere. Some few hospitals should be designated for the care of these premature infants, and provision made for adequately trained medical and nursing staffs and for the necessary proper equipment and rooms in these hospitals for saving the lives of more of these infants in Montana.

There has been some recent work on respiratory physiology that is of considerable importance to any one dealing with either premature or full-term newborn infants.^{8,9,10} Some of these facts dealing with intrauterine respiratory movements were pointed out by Winslow over 150 years ago. Some of the points emphasized by these workers are:

1. Fetal respiratory movements are physiological, and with these movements there is circulation of amniotic fluid in the fetal lung.
2. The inhalation of carbon dioxide by the mother does not stimulate respiratory movements in the fetus.
3. Anesthetic and analgesic drugs markedly depress or completely stop the fetal respiratory movements.

Eastman and his co-workers at Johns Hopkins has shown that in the blood of the asphyxiated infants, there is a decreased oxygen saturation and an increased carbon dioxide tension.¹¹ We should remember that the mechanism of postnatal respiration is not a new function, that the treatment of apnea at birth is an attempt to preserve and continue a delicate mechanism already in existence. In these apneic infants, whether premature or full-term, be sure to do nothing to increase or aggravate the state of shock or collapse, no cold water immersions, shakings, etc. Body heat *must* be maintained. We should also remember that the need of these babes is for oxygen, not for carbon dioxide, of which they already have an over-abundance. Consequently, secure and maintain as clear a passage for the entrance of oxygen into the lungs as is possible. If necessary clear the passage by means of an intra-tracheal catheter. Oxygen must be supplied freely, and often for a prolonged period of time. The use of drugs, such as alpha-lobeline, or coramine, in the resuscitation of apneic babes may be, and probably should be used, although the results are not at all dramatic.

After prematurity, by far the next greatest cause of neonatal death are the congenital malformations. Relatively few of these, except those of the external parts

of the body which are usually not dangerous to life, are amenable to successful surgical therapy. In many of these cases, the death of the afflicted child is a happy relief to both infant and parents, and in my opinion, surgery of any type on these unfortunate infants, should be both well considered and conservative.

Pneumonia of infants will probably always be one of the most dreaded diseases. Until mothers and other relatives of the infant understand and appreciate that the prophylactic treatment of pneumonia, that is, the strict isolation of the child from any one with an upper respiratory tract infection, is an essential part of the hygienic therapy of childhood, the disease Osler termed the "friend of the aged" will continue to be the scourge of the infant. In the active treatment of most pneumonias in infants, the specific serum therapy has no great place. The immediate hospitalization of these infants with an oxygen tent instantly available is to my mind the treatment par excellence. As yet, the use of the newer chemicals such as sulfapyridine is of too recent origin for one to be able to make a positive statement as to their value in the treatment of childhood and infant pneumonias.

The gastro-enteric infections are the cause of relatively few neonatal deaths among Montana infants. The education of the mother as to proper and clean methods of feeding her infant, the superiority of breast over any type of artificial feeding, will save many lives. The larger percentage of infantile deaths in Montana are from the rural districts. The economic factor probably plays a large role, as is true the world over. Most cases of infantile diarrhea are also directly related to the intelligence and industry of the mother. As yet, no known newborn nursery in Montana has been afflicted with an epidemic of diarrheas among the newborn as has been reported from some Eastern hospitals.^{12,13} There have been several other unreported epidemics and in all the fatality rate has been high. It certainly behooves every hospital, and every physician having contact with the newborn nursery in that hospital, to check over carefully the adequacy of the care of these infants. Too few American infants are breast fed to secure the minimum mortality rate possible. Rodda¹⁴ especially has emphasized this to his many students and to physicians scattered over the Northwestern states, but sometimes one feels their memory is short, for there are far more babes fed artificially than necessary, and far too many symptoms of illness blamed on breast milk. There is too much attention paid to the initial weight loss of the newborn. Hunger is the best stimulant to vigorous nursing on the part of the infant, and this in turn is the best stimulant to secure the secretion of milk in the mother's breast. The too early giving of various formulas and mixtures to the newborn infant is a detriment because it eliminates hunger. Artificial stimulation of the breasts, especially by manual expression, is a great aid in many cases. For the continuance of an ample breast milk supply, the necessity of sufficient rest both physical and mental for the mother is not properly emphasized. We have all seen the sudden dwindling of the milk supply of a mother during a time of stress. The importance of

breast feeding is sufficiently great to warrant sacrifice on the part of the mother and more careful attention by the physician.

While relatively few infants in Montana die of contagious diseases, it is during infancy that the greatest success in the use of vaccine is obtained. Therefore, I have felt a few words as to the contagious diseases are not out of place in this paper. In advising vaccinations for the various contagious diseases, any physician in private practice should be very conservative. He should advise only those thoroughly proven to be successful. The experimental work, with its great difficulty of running controls, belongs in the large teaching and research institutions. We can all remember the furore caused several years ago by the publication of Leake's article regarding the fatalities following active immunization against poliomyelitis.¹⁵ Mothers are pessimists, and when one child is vaccinated or inoculated and later becomes ill with the disease supposedly immunized against, we have undoubtedly cost other children their chance of protection against other diseases for which we have a satisfactory prophylactic immunization. Every infant should be immunized against diphtheria and variola. I feel that in private practice the prophylactic treatment of scarlet fever and measles is not justifiable. The prophylactic treatment of pertussis is still experimental.¹⁶ For that reason I do not use it as a routine measure in private practice, although I have no argument with any physician who may wish to do so.

In Montana, we have no legal means of compulsorily vaccinating any individual, including children before entering or while attending school. Also the enforcing of any quarantine regulation is either entirely or practically ignored in almost, if not all, of our smaller towns, villages and communities; consequently, our morbidity and mortality for all contagious disease is far above what it should be. Too many of our physicians neglect the constant education of the mothers that is necessary in order to get a high percentage of these children vaccinated. The remedy is to be found when we are able to elect an intelligent and informed public health minded legislative body that will put compulsory vaccination on the statute books.

As an aid in the lowering of infant mortality rates, hospital staffs and individual physicians should analyze their records of infantile mortality and morbidity, compare these with well known and recognized standards, and in that way learn their deficiencies and needs. In these studies, if they are to be useful, more adequate necropsies must be stressed.

In conclusion, I wish to quote from Zahorsky:¹⁷ "The greatest danger to human existence is the danger of being born. The next greatest danger is the complicated adjustment to an extra-uterine life. Infant mortality of the first week of life is enormous, about 3 per cent, and in spite of all recent advantages of maternal care and the practice of obstetrics, this figure changes practically not at all. Our prophylactic measures seem to have their maximum efficiency, and further advances can only be made after a colossal change has been made in social conditions."

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Rheumatic Fever in Children*

Evidences of Activity of the Infection and Notes on Various Therapeutic Procedures

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ONE of the most important problems we have today in the entire field of pediatrics is rheumatic fever. The devastating effect of this disease as shown by the high mortality rate and the physiologic crippling of its victims stands as a distinct challenge to the entire medical profession. Studies from various large centers such as New York City show that heart disease is the leading cause of death in girls of school age and second only to accidents in the boys. In the United States Registration Area, heart disease is the fourth largest cause of death in children of school age.¹ Dublin² states that a child of ten years has three times as many chances of dying from heart disease as from tuberculosis. For each death from heart disease, there are 10 to 17 patients suffering with the disease; whereas for each death from tuberculosis there are but seven patients with the disease. In Philadelphia in 1936 rheumatic heart disease resulted in more deaths in those less than 20 years of age than pertussis, measles, meningococcic meningitis, diphtheria, scarlet fever and poliomyelitis combined.³ Kaiser⁴ states that 1 to 3 per cent of all school children at any one time have rheumatic fever and 8 to 10 per cent of all school children at some time are afflicted with this disease. Our efforts to gain insight into the underlying nature of the disturbances in this condition have failed to bear the rewards attained in certain other pathological states. Until we find the proper combination for an effective therapy in this dis-

ease, we will continue to find that in a ten-year follow-up period about one-third of the children with rheumatic fever are dead and another one-third are cardiac cripples of various degrees.

From the distinctly practical viewpoint on the care of children with rheumatic fever, we are faced with the problem of determining when rheumatic activity has subsided to that point where it is safe to remove restrictions. Unfortunately, this problem is not simple but rests upon one's clinical judgment to correlate many facts and to interpret them wisely. There are no set rules or criteria by which it is possible to determine the character or the degree of activity of the infection in rheumatic fever. In the Eustis Children's Hospital and Out-Patient Cardiac Clinic of the Department of Pediatrics of the University of Minnesota, we have followed the ensuing factors in our attempts to evaluate the activity of the infection:

I. Symptomatology and physical findings or specific manifestations of rheumatic fever:

A. *Joint symptoms.* Pain is the most consistent finding; may be tenderness and swelling, but redness occurs uncommonly. The extreme mildness of symptoms and the few joints involved are the characteristic features in children. Knee, ankle, hip, elbow and small joints are most frequently involved. Rheumatic arthritis is often not heeded as a serious symptom by both the parent and the physician. Lésque long ago said

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that rheumatic fever "licks the joints and bites the heart."

- B. *Subcutaneous rheumatic nodules* — a manifestation of rheumatic fever which frequently seems to foretell the grave character of future events for the patient and which is often overlooked by the examining physician.
- C. *Carditis* (peri-, myo-, endo-, pancarditis). Two features of carditis which seem to stand out particularly are (a) the great frequency with which heart involvement occurs or is demonstrable during the acute phase of the infection, and (b) the relatively high incidence of carditis as the first manifestation of rheumatic fever. Eighteen per cent of a large series of cases had carditis as the initial manifestation of rheumatic fever.¹ Prostration, weakness, dyspnea, cyanosis, precordial pain, tachycardia, tic-tac rhythm, distant or muffled tones, murmurs and pericardial rubs, even outspoken decompensation are signs of carditis, but it is necessary to carefully examine the heart in all cases. Chronic valvular disease usually results from repeated attacks, seldom from one attack.
- D. *Chorea minor* — easy to recognize when outspoken symptoms are present, but the mild and early cases are often overlooked. The use of finer tests[‡] and pointed inquiry into the emotional status of the subject are points necessary to detect many of these cases.
- E. *Skin manifestations*. Certain skin symptoms, erythematous (erythema multiformi, erythema nodosum, erythema annular, erythema rheumatica) and purpuric in nature are believed by some to be of possible rheumatic origin because of the frequency with which they occur during the course of rheumatic fever episodes.
- F. *Respiratory and other infections* often initiate, precede or are associated with rheumatic episodes, such as pharyngitis, tonsillitis, coryza, sore throat, "flu", scarlet fever, nephritis, myalgia and inflammation of serous membranes such as pleura, lungs, peritoneum and also the appendix.
- G. *General manifestations*—those which occur frequently in rheumatic fever, yet are not specifically characteristic of that disease alone, such as anorexia, malaise, weight loss, epistaxis, fever, weakness, "growing pains," pallor, sweating, prostration, lassitude, fretfulness, fever, rapid pulse, moderate leucocytosis, secondary anemia, and malnutrition.

II. Cardiac findings:

Distant heart tones, rapid heart rate, disturbances in rhythm, change in character of the cardiac impulse, enlargement of heart, presence

[‡]Placing the child under an acute strain such as is used here, namely: Have the patient rest the palms of his hands squarely upon the examiner's, who holds his hands palms upward in front of him, and have the subject place his tongue between his lips without biting the tongue and then ask him to sit very still. Normally even a child of 3 to 5 years should be able to stay very quiet for a period of several minutes, whereas the child with mild chorea will have twitching of the face muscles and slight movements of the arms, fingers, or shoulder muscles.

of thrills, development of precordial rubs and murmurs with changes in their character are points to be considered when determining rheumatic activity.

III. X-ray studies:

These give one valuable information concerning the condition of the heart in the attempt to exactly evaluate a given case. Of special importance is the development of esophageal displacement by the left auricle in early mitral heart disease.

IV. Electrocardiogram:

This is an important procedure for use in determining evidence of rheumatic activity. Swift⁵ states that 95 per cent of subjects during the acute phase of rheumatic fever show electrocardiographic changes indicative of rheumatic activity. The following changes are those most frequently interpreted as indicative of rheumatic involvement of the myocardium.

1. PR interval prolonged.
2. P notched, especially P₃.
3. Swift lead.
4. Pardee Q₃.
5. S-T interval not isoelectric, and more than 0.5 mm. elevated or depressed in relation to PR.
6. P_{1&2} and T_{1&2} negative.
7. P & T height more than 5 mm.
8. QRS complex, slurring, splintering, widening, M & W forms. Upper limit of normal is 0.1 sec.
9. Low amplitude of all waves.
10. Miscellaneous.

V. Heart sound recording apparatus:

This means of study of heart disease has been used in our clinic for the past three years. This device is proving to be particularly valuable as an aid in the teaching of heart disease to students, yet also serves as a means of obtaining a permanent graphic record. The success of this procedure is due to the diligent and persevering efforts of Dr. Paul Dwan of the Department of Pediatrics of the University of Minnesota. That this device may prove to have more than academic value seems probable in the light of recent observations which have demonstrated the presence of diastolic murmurs long before they were audible to any of the examiners.

VI. Routine laboratory data:

Hemoglobin, leucocyte and differential white blood cell counts also aid in determining rheumatic activity. A falling hemoglobin or failure to rise if previously low often may be the result of rheumatic activity. The leucocyte count has proven to be of relatively little value to us in following the progress of rheumatic fever subjects, especially in mild cases. Juster,⁶ on the other hand, finds this to be a valuable guide in determining the activity of the infection in adult

subjects. A shift to the left as determined by the Schilling hemogram often aids materially in the detection of rheumatic activity.

VII. *Sedimentation rate of red blood cells:*

This procedure is probably the most useful of the routine laboratory procedures used in determining rheumatic activity. In our studies we have used the large Westergren tubes. We consider a falling rate in the neighborhood of 10 mm. in 60 minutes to be within normal limits. In many instances the recommendations in any given case rest upon the outcome of the rate of settling of the erythrocytes.

VIII. *Weltmann reaction:*

This is another simple laboratory procedure, the usefulness of which we are attempting to evaluate in the determination of rheumatic activity. Diluted serum is added to ten test tubes containing concentrations of CaCl₂ from 0.1 per cent to 0.01 per cent and are numbered 1 to 10 respectively. The tubes are placed in boiling water and read after 15 minutes. Coagulation of the protein occurs normally in all concentrations up to tube No. 6 and this is then referred to as a Weltmann reaction of 6. In the presence of active infection we find readings of 1 to 5. Levinson, Klein and Rosenblum⁸ made a comparison of the Weltmann reaction and the sedimentation rate in a number of different diseases, including rheumatic fever. We are attempting to ascertain the relative values of these two procedures in determining the degree of rheumatic activity by comparing the results obtained with other clinical data in various phases of the infection.

It is not possible to state any set rules or criteria for the management of the various manifestations of rheumatic fever. The more information available concerning any given patient, the greater is the degree of accuracy likely in the interpretation of the value of various therapeutic procedures used in this condition. It is well known that it is impossible to predict the outcome of any particular case, but by and large, the most efficient management will be obtained by evaluating the findings of the various laboratory procedures in the light of the clinical findings. Rather than attempt to summarize our data in complete detail by the extensive discussion of many cases, I shall endeavor to illustrate by example cases the points in our experience which seem worthy of consideration. For the sake of brevity we have so far as possible presented the various clinical and laboratory data in a diagrammatic way in order to obtain a comprehensive view of the case to facilitate our interpretations.

Case 1, J. B.—a 15-year-old girl (see fig. 1): Noteworthy in this case is the fact that evidences of rheumatic activity persisted for a period of two years coincident with the first attack of rheumatic fever. The development of mitral heart disease as occurred here is the most common by far of the sequella of rheumatic fever. Of special interest was the demonstration of a diastolic murmur by the heart sound tracing, shown repeat-

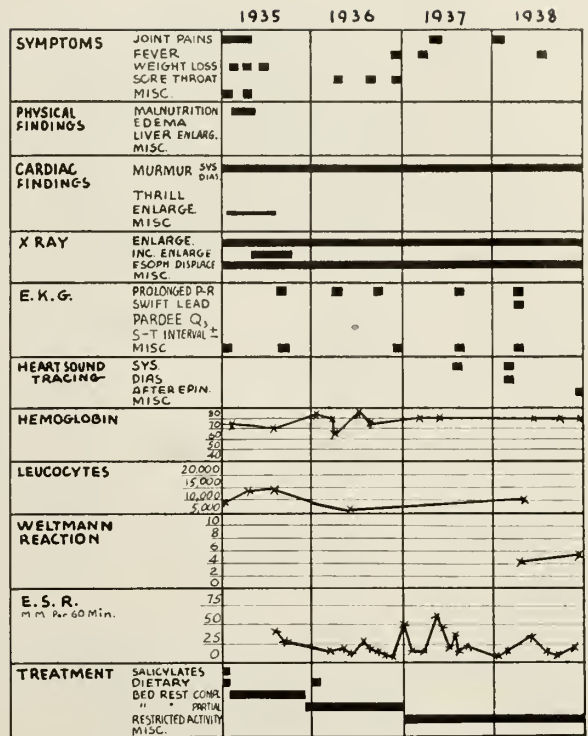


Fig. 1. J. B. 15 yrs. Admitted 4-3-'35. Tonsillitis Jan. '35. Joint and muscle pains Feb. '35.

edly, but inaudible to any of the examiners. This feature of the possible predicting of murmurs by first eliciting them with a heart sound recording device is being studied in the Heart Clinic by Dwan and the author.

Case 2, R. A.—a 12-year-old girl (see fig. 2): Remarkable was the fact that this child had joint pains for a period of 12 years, yet neither the mother nor the physician made any effort to restrict her activity. The fact that marked stenosis of the mitral valve had developed indicated that the heart damage was of long duration. Fever, joint and abdominal pain, the development of subcutaneous rheumatic nodules which proved to be an ominous sign, and electrocardiographic changes indicated the acuteness of the infection, yet in spite of this the leucocytes and differential white cell count were essentially normal. Even though the infection was very active toward the latter part of the illness, the sedimentation rate of the red blood cells rapidly began to approach normal values. It is interesting to note that the Weltmann reaction remained low. Special studies are now in progress to determine the value of the Weltmann reaction in just such conditions as this where the sedimentation rate falls to normal yet the condition of the patient is not improving. This case also shows the futility of many therapeutic measures in rheumatic fever. Strict bed rest, sedation, salicylates, oxygen, convalescent scarlet fever serum, digitalis, thiamin, as well as small multiple direct blood transfusions which previously seemed to be helpful in a number of instances,⁹ all were ineffective in altering the course or character of the disease in this child. At necropsy, pancarditis, pericardial adhesions, marked myocardial changes and valvulitis were found, which again emphasizes the need of some active agent to combat the devastating effects of the infection.

Case 3, L. V. K.—a 15-year-old girl (see fig. 3): Although joint symptoms are usually mild in character in older children, one may find, in addition to pain, the redness, swelling and tenderness which make up the typical adult picture. Multiple direct blood transfusions seemed to have an effect in reducing the rapid sedimentation rate as well as improving the general condition of the patient. Of particular interest here was the

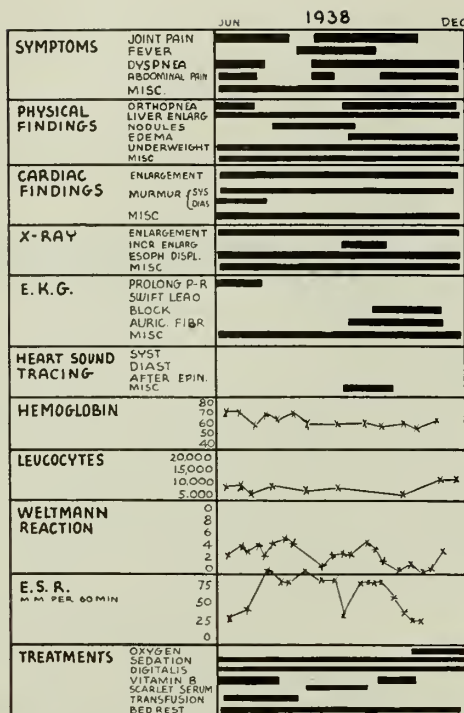


Fig. 2. R. A. 15 yrs. Admitted 6-20-'38. Pains in joints since 3 yrs. of age. Dyspnea 3-4 yrs. Never confined to bed.

development of hemi-chorea which responded most dramatically to fever therapy with the Kettering hypertherm. Even after the first treatment, the patient herself noted an increased strength in her hands and a great improvement in her ability to control her muscular movements. All signs and symptoms of chorea disappeared after three treatments. So far the patient has escaped heart disease in spite of two episodes of rheumatic fever.

Case 4, G. F.—a 12-year-old boy (see fig. 4): After nearly ten years of a low grade smouldering type of infection, the diastolic murmur indicative of aortic regurgitation developed. Of the secondary signs of aortic regurgitation, the first to develop was the increase in pulse pressure. Capillary pulsation and water-hammer pulse were late in developing, but particularly significant was the fact that in spite of the aortic lesion being present for at least seven years the heart showed no enlargement, whatsoever, by X-ray. Streptococcal vaccine was used for a period in 1933, but its effectiveness was difficult to evaluate. This case again demonstrates the usually good prognosis of pure aortic regurgitation.

Case 5, G. N.—a 7-year-old girl (see fig. 5): Again we have an example of the futility of various therapeutic measures such as bed rest, sedation, salicylates, oxygen, digitalis and multiple direct blood transfusions in the extremely ill child with pronounced cardiac symptoms with active rheumatic infection. The child was kept in oxygen continuously, a matter which was of some concern to the bookkeeping office when the charges for this item alone totaled over \$1500 after a period of several months. In addition to this, it was necessary to use opiates as a sedative until the subject became entirely dependent upon this type of medication for relief of the symptoms of pain and dyspnea. During this time for several months the child ran a subnormal temperature, even to 94 F. (rectal) and suffered from marked anorexia. It was after several months of futile efforts in obtaining any improvement that Dr. I. McQuarrie, chief of the pediatric service, suggested that thiamin or vitamin B₁ in large doses be tried, as Weiss¹⁰ had recommended for adults with heart disease. Two thousand international units, or 6.6 mg. of thiamin were given subcutaneously daily for one week, then 1 mg. doses were given by mouth. In the next few

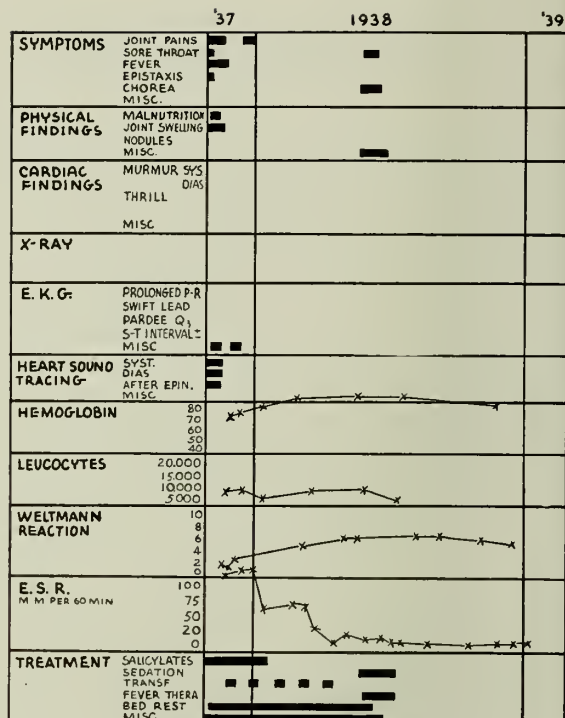


Fig. 3. L. V. K. 15 yrs. Admitted 11-27-'37. Attack tonsillitis 3 weeks before. Acutely red, swollen, tender, painful joints. Fever, weight loss, fatigue.

days the most decided and strikingly drastic change that we have ever witnessed in the clinical picture of a child with rheumatic heart disease occurred. In a short time the dyspnea and orthopnea disappeared, the liver began to shrink in size and the edema vanished; within another day or two the appetite returned and there was a smiling, happy child in place of the miserable, suffering girl of the past few months. The cardiac outline as demonstrated by the 6 ft. plate also decreased definitely during this one week interval. Her heart lesion is still present, but her general condition has remained quite satisfactory this past one and one-half years. This shows that deficiency diseases may develop in spite of hospital care and that even in children, thiamin in large doses may prove to be a life-saving medication.

Of all the various therapeutic procedures used in rheumatic fever and rheumatic heart disease, the only one which meets with universal acceptance is *bed rest*. The question most frequently asked is "How long shall the child be kept in bed?". In general it may be said that six weeks' strict rest in bed after all signs of activity of the infection have disappeared is a comparatively safe, but admittedly elastic rule, to follow. The most important question again is, "What are the signs of activity of the infection?". As stated previously this is best answered by a thorough review of the history and laboratory data, which in turn, must be interpreted in the light of the clinical findings in each individual case. Briefly, the most important of these features, which have been discussed at length above, are as follows:

I. History:

Epistaxis, joint and muscle pains, nervousness, emotional disturbances, anorexia, weight loss,

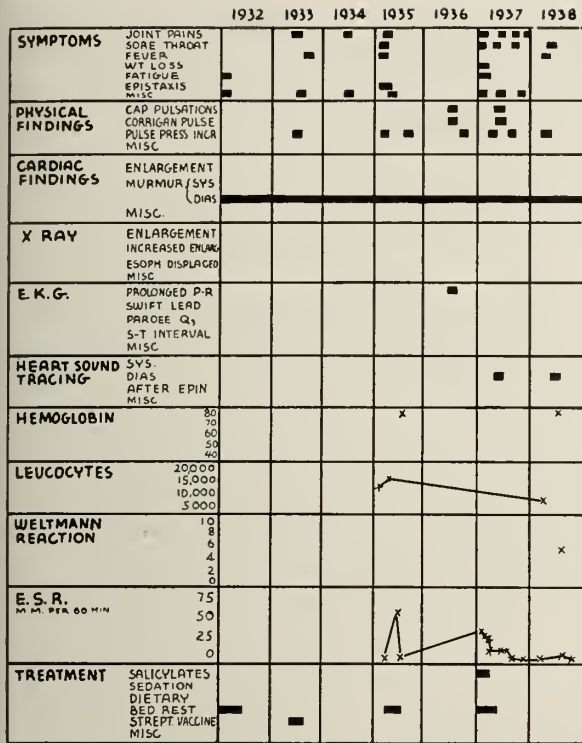


Fig. 4. G. F. 12 yrs. Admitted 7-5-'32. Painful stiff joints at 2½ yrs. Past 6 yrs. periodic attack joint pains, sore throats, fever, fatigue, anorexia, epistaxis.

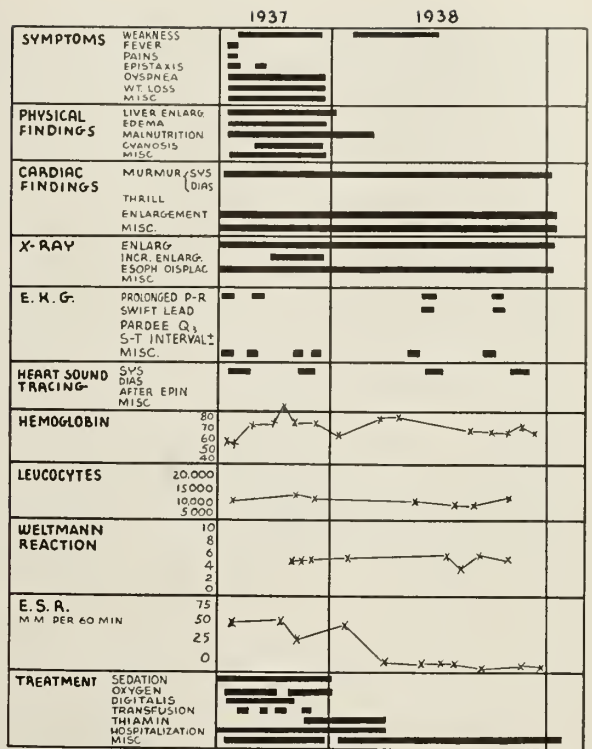


Fig. 5. G. N. 7 yrs. Admitted 6-11-'37. Weakness, anorexia, weight loss, pallor, epistaxis, also some pain in hips beginning March, 1937.

prostration, weakness, lassitude, malaise, fever, frequent upper respiratory infections, precordial pain, and dyspnea indicate that the infection is still active.

II. *Physical findings:*

Malnutrition, subcutaneous rheumatic nodules, pallor (out of proportion to the anemia), tachycardia, choreiform movements, accentuation of murmurs, muffling of heart tones, presence of precordial rubs, weakness, sweating, rheumatic skin eruptions, cyanosis, signs of cardiac decompensation, and cardiac irregularities are the physical signs which signify activity.

III. *Laboratory data:*

Development of evidences of rheumatic involvement of the myocardium as shown by electrocardiographic tracings; development of enlargement of the heart as shown by 6 ft. plates and esophogram on X-ray examination; low or decreasing hemoglobin; leucocytosis; shift to left by Schilling hemogram; persistently low Weltmann reactions; and other things being equal, probably the most important of the various laboratory procedures, rapid sedimentation rate of the red blood cells are the laboratory procedures which aid one in determining activity of the rheumatic infections.

Other treatment during this period of bed rest for the most part is symptomatic. No specific measures have as yet been devised to combat the infection itself. Re-

sumption of activity should be gradual, such as sitting up in a chair for one-half hour twice daily for one week, then increase this by 15 minutes daily until the rest in bed is equivalent to a nap in the late morning and a long nap in the afternoon. After about two weeks, allow bathroom privileges and increase the indoor exercise periods 15 minutes daily for two to three weeks; then allow the child to go outside. With the gradual resumption of activity, most important is the effect on the patient and on the various laboratory tests, and these results, subject to the clinical judgment of the physician, will indicate the future handling of the case. It is to be remembered that the average rheumatic fever attack lasts about four months; however, there is a great deal of variation in individual cases. General hygienic measures and careful selection of the dietary needs of the subject with prophylactic and symptomatic treatment of any deficiency are obvious features of proper care. According to a number of investigators, the indications for removal of the tonsils and adenoids are the same as if the rheumatic infection had never occurred. If removal of the tonsils and adenoids is deemed advisable, it is best to wait until several weeks after all signs of rheumatic activity have disappeared.

Even with the numerous therapeutic procedures used in rheumatic fever, one is usually left with the feeling of frustration as regards the general success of treatment in this condition. It appears that the best therapeutic measure so far known has been pointed out by nature herself, namely, that this disease varies greatly

in its geographic distribution. However, the impracticability of sending children with rheumatic fever to warm climates, such as Porto Rico, Cuba, Southern Florida, in the overwhelming majority of instances is too obvious to stress to any extent.¹¹ The need for a specific chemotherapeutic agent in rheumatic fever has long been recognized. When the effect of sulfanilamide became known, it was not long before it was recognized in many parts of the world that this remarkable agent was without benefit in the acute phase of this disease. The efforts of Dwan and myself to use sulfanilamide as a prophylactic agent for administration in the period of quiescence in rheumatic fever in a small series of cases has been discouraged by the increasing number of reports of the toxicity of this drug. However, the encouraging recent report of Coburn¹² offers a hope for the prevention of the worst feature of rheumatic fever, namely, that of the profound tendency to recur. It is the repeated attacks of the disease which cause it to be so destructive. Coburn administered 2 to 3 Gm. of sulfanilamide daily for a period of six months or more to

three different groups of children with rheumatic fever. In 79 of the 80 subjects there were no signs of a flaring-up of the rheumatic symptoms during this time. It is hoped that this promising lead will be borne out by more extensive investigation.

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Cerebral Palsy*

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"It can never be realized too widely that deformity is an unnatural and preventable affliction which treatment may alleviate or cure, but which a more complete understanding could abolish."—SIR ROBERT JONES.

DOWN through the ages historians have recorded the happenings of their day. Hidden among the thousands of words that make up the archival records, a reader will find references to persons with malformed bodies; cripples whose distorted physical beings have made them the object of comment and sympathy by the physically fit. Ancient tomes record the uncerimonious disposition of maimed persons. Three thousand years ago cripples were not permitted to live. Roman fathers of a later date were permitted, with the assent of five neighbors, to put crippled children to death. They purchased gaily decorated caskets, placed their deformed babies within and set them adrift on the waters of the Tiber. Oriental people turned their cripples out to wander in the wilderness; in ancient India they were cast upon the Ganges, and the early Greeks were accustomed to destroy their imperfect citizens, to maintain a racial physical superiority. The Athenians allowed their crippled children to die of cold and neglect while the Spartans took theirs to the hilltops and killed them.

In more modern times the distorted body was looked upon as a thing to be avoided and feared as if possessed of an evil spirit. In our early American history there are references to individuals born physically imperfect

*Editor's Note: This paper presents the viewpoints of a lay individual who has spastic cerebral paralysis.

or with bodies twisted from the ravages of diseases who were thought to be the perpetrators of many acts of witchcraft. Down through the ages, even to comparatively modern time, the plight of the cripple has rarely been judiciously considered. Previous to the turn of the twentieth century, handicapped persons were looked upon with distaste, as some thing unclean that should be avoided. Spasmodic interest during the early 1900's brought increased recognition of the possibility of alleviating the effects of crippling diseases such as infantile paralysis and arthritis. After the holocaust of 1914 to 1918, the desolation of the maimed was brought to the attention of the general public through the return of many men who bore battered bodies as marks of their efforts in behalf of "Democracy". Then and not until then, though thousands of years had passed, was the world in general awakened to the needs of less fortunate persons.

It is the hope of the writer to present a word picture that will serve as a means of enlightenment on a problem that has long been the unhappy source of agony to many. In most every community there are some characters whose halting gaits, incoherent speech, and nervous reactions have branded them as not quite sufficient mentally. It is a study of this particular type which I will attempt to interpret for you. In many of these cases, the mentality is not impaired. It is only a lack of coordination between mind and nerve centers or motor control that makes the victim slow in carrying out the dic-

tates of the mind. Desperation in trying to speed up the process merely confuses and thwarts the spastic person, causing facial reactions that are construed by many to indicate idiocy or imbecility. Unsympathetic and injudicious denunciation by normal persons seriously injures what we choose to call "feelings" of the handicapped person. You can readily imagine the unhappiness that is caused; the barbed knife that is twisted in the soul of the victim. I know, *for I am one of them.*

I belong to that all too vast army known as "spastics" but which should be properly termed victims of cerebral palsy. A word about myself will be excusable, I am sure, and must be inserted to lend authenticity to the information and beliefs contained in this article. Born of average American parents, my early life was naturally curtailed because of my infirmity. Graduation from high school was accomplished only after a very laborious process. After matriculating at the University of Minnesota I immediately set as one of my goals the dissemination of all procurable information pertaining to my affliction. The following will be a summary of my deductions and recommendations. I trust that they will aid future recognition of the truth about spastics. Let me add that at present I am employed by *The Minnesota Association for Crippled Children and Disabled Adults* located in Minneapolis, Minnesota.

Ardent search and diligent study of all books, pamphlets and treatises on the subject of "Spastic Paralysis" has disclosed to me that there is an astounding lack of dependable, scientific information on the subject. This is doubtless attributable to several reasons, chief among which is the fact that, until quite recently, even the medical profession failed to differentiate clearly between the mentally defective "spastics" and those whose mentality is normal. As was stated above, in all cases the lack of motor control is marked, conveying the erroneous opinion that all spastics are imbeciles or idiots. This is far from the truth. In the preface of a recent book on "Spastics" it is stated that, "It is common knowledge that some of the world's finest minds are housed in athetotic bodies, whose every expression and movement belie the fact."

Corrective measures and treatments applied to "spastic cases" are of comparatively recent origin. The meager progress thus far made compels us to recognize that the treatment of this baffling affliction is largely in its experimental stage. I have searched the works of the known authorities on this subject, but, without depreciation of their efforts, I must confess that I have gained a far greater fund of information directly from physicians and psychologists, some of whom, at my request, have contributed articles summarizing their views as gained from practical experience. Serious discussion with others afflicted with "spastic paralysis" has shaped many of the views which I now hold.

TYPES OF "SPASTIC PARALYSIS"

As before stated, the term "spastic paralysis" is a misnomer. The term cerebral palsy is perhaps more accurate. Dr. Earl Carlson,² director of reëducation, Neurological Institute of New York, seems to suggest that

there are three types or groups of cases: (a) Those cases where the brain structure has been destroyed beyond repair; (b) cases where the brain remains normal, but motor control is partially or completely lacking, and (c) cases belonging to the second group where the mental and physical defects grow progressively worse.

HISTORICAL OBSERVATIONS

An estimate by Dr. Irving S. Cutter of New York indicates that there are approximately 150,000 children born dead or who die shortly after delivery in the United States each year. About one-half of these deaths may be traced to pressure damage to the brain at natal attendance. While cerebral paralysis may result from an injury after birth, it is thought that most cases are traceable to birth injuries to the brain.

In 1861 at a meeting of the Obstetrical Society of London, Dr. W. J. Little asserted that a large percentage of mental deficiency was caused by pressure damage to the brain at time of birth. These views served as an inspiration for the work done by Dr. Edgar A. Doll of the Vineland Training School of New Jersey whose studies have been compiled in his splendid book titled, "Mental Deficiency Due to Birth Injuries," published in 1932. Assisting Dr. Doll in this work were Dr. Phelps and Ruth Taylor Melcher, research assistant of the Training School at Vineland. Noting the dates of the foregoing statements, it will be seen that the science of the treatment of spastic cases is comparatively new. Placing stress on avoidance of birth injuries is judged to be necessary by the medical profession.

Dr. Doll says, "Motor reëducation might affect physical development two ways. First, by educating nerve centers to perform the natural duties of those destroyed. Second, by eliminating the bizarre cortical habit patterns which have been established and substituting in their stead more normal, similar patterns of muscular activity. Mental improvement, in turn, might result from a release of means of ideational expression. Obviously, the relative importance of the three possibilities of improvement varies significantly with the age of the patient. If treatment is begun in very young children, no cortical action patterns have as yet been developed. The problem there is to establish the proper patterns and insure as complete opportunity for the expression of mental growth as possible, rather than to raise patterns already established and substitute for them other patterns. However, the problem of coöperation in young children is so much greater than that in older ones that the difficulties of the two ages are about equal. Physical improvement in adults is often more astonishing than that in children, as the conditions have been fixed for so long a period of years that the patients do not believe any change can possibly take place. Mental improvement has also been observed in older patients."

Reviewing the preamble to this article, we aver that not many years ago the spastic was regarded as being possessed of the devil. Two thousand years ago such a handicapped person was destroyed; five hundred years ago he was ostracized from society; one hundred years ago he was only endured; and only within the past brief

fifty years has society attempted to salvage the handicapped. Many articles have been written that review effectively the story of the change in social attitude toward the defective and deformed person.

CHARACTERISTICS OF "SPASTIC PARALYSIS"

The Physiological Management of Childern Handicapped by Cerebral Palsy, a pamphlet issued in 1929 by Dr. Bronson Crothers of Harvard Medical School, a comprehensive study of the characteristics of "spastics", describes four main types of disturbances which may occur as a result of injury to the brain either at or following birth. (1) *Injury to the cerebellum*, such as results in confusion of motion. This type of injury is characterized by failure of the muscles to coördinate, producing an unsteady gait and violent, spasmodic contraction of the muscles. According to Dr. Crothers, this type of spastic paralysis is likely to become progressive and calls for constant treatment, at least in the early stages. (2) *Injury to the basal ganglia*. The function of these cells is highly important as it is supposed that they control the coördinate muscular movement. Characteristics of injury of these ganglia are impediment in speech, stuttering, drooling, difficulty in swallowing and definite facial contortions. Dr. Crothers states his belief that persons with this type of disease are not mentally deficient. (3) *Injury to the cortex of cerebral hemispheres*. If injury results in a lesion of the motor cortex the defects resulting are characterized by a stiffness in muscular control followed by intervals of exaggerated movements. (4) *Injury to brain area affecting intelligence*. Victims in this classification are definitely in the minority.

It is apparent from the above that it is not a simple task to classify a spastic accurately in the classes enumerated. The prognosis is not hopeless, except in the fourth class where intelligence has been too greatly impaired. It is the belief of Dr. Edward T. Evans of Minneapolis that there are two main types of spastic paralysis: the hereditary type and the acquired type. He states that the acquired type is usually the result of cerebral hemorrhage, adding that while considerable is known about the acquired type, very little is known about the hereditary type. He grants, in fact, that there may be even a dispute as to whether or not there is a true hereditary type.

Returning to Dr. Doll's statements regarding cerebral injuries at birth, he says they may result from some abnormalcy or subnormalcy during the term of pregnancy; the duration of labor; the fetal presentation; the use of instruments; deficient animation or artificial respiration.

METHOD OF TREATMENT

The term physiotherapy best describes the most feasible method for treating spastic paralysis victims. Physiotherapy is applied to the finer movements of the muscles through the medium of heat and massage and exercise. Space limitations prevent elaboration here as physiotherapy is definitely a field by itself.

Dr. Earl Carlson, a spastic himself, feels that the main problem of reëducation is to salvage the "undamaged residue," and he lays stress on the fact that there is a tendency to "overrate the handicap and to undervalue the undamaged residue."

Mental Attitude: Too much stress cannot be placed on the importance of the patient's mental attitude. Unequivocally the attitude of a spastic is one of moroseness. This is easily understandable but little improvement can be accomplished until a spirit of optimism is created. Tedious training in determination and will power to overcome the deficiencies is necessary. It will be of prime value to treatment if the patient can be taught to ignore the deficiencies. Assumption of an air of cheerfulness will follow but the procedure is one that requires much ingenuity and persistence. As accomplishment manifests itself, a natural reaction is the minimizing of the deficiencies on the part of the patient.

Motor Control: Effective aid can only be acquired through the control and coördination of the muscles. Here the art of relaxation is of chief significance. Drs. Evans, Carlson and others recommend the use of poems and music to promote rhythmic movements.

Emphasis on treatments to promote "muscle balance" through gymnasium work, standing, walking and climbing is advocated by those in charge of the Curative Work Shop in Minneapolis. Superficial muscular exercises, as well as the deeper muscular treatments, including the extending and flexing of joints have brought marked advantages at the Minneapolis institution. Coördination of muscles is promoted at the Curative Work Shop also by Occupational Therapy which includes the manipulation of mechanical devices and the performance of various tasks requiring a higher or lesser degree of skill.

In the matter of stuttering, which is recognized as a form of spasticity, a novel form of treatment has been devised. The stutterer stands before a mirror and attempts to stutter voluntarily. This has a tendency to build up a resistance against stuttering. This may sound somewhat paradoxical but the opinion is that stuttering is a "deep-seated neurological disturbance of the central nervous system." The above described treatment has shown substantial results. The application of mirror-controlled treatment in the training of victims of spastic paralysis so as to include arms, legs and general body movements would be very interesting to study.

Hydrotherapy: Devised originally for the treatment of poliomyelitis, hydrotherapy has been found to have a definite part in assisting spastics. Immersing in water has a first result that makes itself apparent at once. A sense of complete relaxation and repose is evident, which is highly essential. This, plus added ease of movement of the limbs through the buoyancy afforded by water encourages continued effort. Naturally the incentive of the treatment, being a form of play, adds to its usefulness.

Electrotherapy: The effective results of the various light rays upon the nervous system is not fully known, but, as applied to spastics, it produces marked benefit by

inducing relaxation so essential to the physical reëducation of the handicapped.

Occupational Therapy: This type of treatment is briefly covered in the discussion relating to motor control heretofore mentioned. Work carried on in this field has produced some remarkable results and a discussion of the complete field and its vast potentialities should be the subject of a complete treatise in itself.

Surgical Treatment: The treatment of spasticity through surgery has been attempted with varying degrees of success attending the effort. Dr. Doll calls attention to the fact that the first surgical treatment for this was by means of tenotomy. Cutting of the tendons to relieve contracture of muscles too often was found to produce opposite results and was soon replaced by a method of lengthening tendons which proved much more successful.

A German orthopedic surgeon, Dr. Stoffel, adhered to the procedure known as severance of the motor nerves and achieved a high degree of success. Dr. Edward T. Evans of Minneapolis has followed this general practice with marked advantageous results. A partial description of the method used by Dr. Evans includes this information: "It embodies the severance of motor nerves in direct proportion to the amount of activity which, by careful observation appears to be present within one particular muscle. . . . The severance of two or three of these motor nerves results in proportionate weakening of the calf muscles and this, in turn, releases the contracture. It is necessary at times to surgically lengthen long-standing shortened muscles by direct attack thereon."

Personal Observations: It is difficult for the normal person to comprehend the emotional experiences of a spastic. Irving S. Cobb's observation that, "The life of a celebrity is a life of a goldfish," is even more apropos to the spastic. He lives in a veritable glass house with the world peering in at him with never-ending curiosity; and from which he looks out upon a world which does not understand him.

My early life was most difficult. I feared that I would fall when walking or that I would drop an object; my greatest fear was that a spasm would seize me in the presence of others, resulting in untold embarrassment. Previous to my school days, those around me were my family, other relatives, and close friends. These people were very kind and understanding; they treated me exactly as one of themselves. It was when I entered school that my actual misery began, for then came realization of how tremendously unlike other children I really was. Normal healthy children can be so painfully cruel in their taunting. I suffered from the moment I entered the school yard in the morning until I returned to my home in the evening. And even then the dread did not leave me, for tomorrow was another school day.

My family did everything in their power to make my life easier. All through the years, I had every medical attention possible. Numerous types of treatments were prescribed but none was successful. Because I had failed to have the proper education and training necessary to

a spastic in my early life, I became oversensitive and developed an inferiority complex. (This was my worst enemy to conquer). My only thought was that I was doomed, sentenced to an eternity of isolation. With the vision of such a future stamped on my brain, I had a great bitterness added to my ever growing feeling of inferiority. Because my appearance caused a wave of curiosity and aversion, I lacked the companionship of children my own age. I could not associate with older people, and I was self-conscious in any society. At about the age of twelve, when my handicap became extremely glaring to me, my mind dwelled on my affliction to such an extent that I grew steadily worse. Always feeling the gaze of others on me, I became even more spasmodic. The lack of proper training to confront this was the underlying cause. I recall noticing particularly that I could not control the stubborn muscles in the presence of others, but that when I was alone, the control reached near perfection. Now at a much later date I can see the reason. In the presence of others, my first impulse when I felt a spasm coming on, was to hold myself even more tense, in trying to avoid conspicuousness. Naturally my muscles became tighter and tighter until they were as taut as piano strings, stretched to the point of breaking. From this there was but one release. One would think the entire store of volition impulses within the central nervous system had been set loose.

When semi-maturity arrived, I became impatient because of the lack of control. There *must* be a way out. I never gave up determination. I recognized that I must master fear, and I tried harder than ever before. I was not going to be classed as a hopeless case. I adopted an attitude of disregard for the doubts of other people. After an extremely trying, laborious time, beyond the expectations of other people, I was graduated from high school. That was a great day in my life. I became cognizant of the fact that knowledge was power, and power meant overcoming fear. I was eager to continue my education even against the doubts and advice of others.

I argued that knowledge would give me the self-reliance I so sorely needed, and enrolled at our State University. At this time I also received the muscle training which I should have had in my early life and which is the only effective type of training for cerebral palsy cases. Soon I noticed a gain in self-confidence. I learned that it was possible to forget oneself and to relax. I became immune to the curious gaze of others, and realized that all my mental powers must be directed toward warding off these nervous explosions. At last, I conquered fear! The sensitiveness and feeling of inferiority waned. I assumed an air of nonchalance and cheerfulness. I cultivated my pride; my mental and nervous control.

I have done and will continue to do everything in my power now to accomplish at least one thing more. I want more than all else in the world to have people understand the spastic and his emotions; to have society cease regarding the victim of cerebral palsy as a curiosity and begin treating him as a normal human being.

I have overcome my difficulty, but I am thinking now of the thousands of children who have the molding of their lives before them. With the proper guidance, they can become useful members of society.

During my employment with the Minnesota Association for Crippled Children and Disabled Adults, I have become cognizant of a constant attempt by persons actively interested in work among all types of cripples to clarify previously shrouded opinions. It is the hope of the association, according to Jean Pierce, executive secretary, that soon a certain percent of the association's budget may be used for special study of the plight of the spastic and perfection of methods of handling the varied problems which these victims face.

I should like to quote here, Miss Pierce, who is so sincerely interested in this work: "I fully believe that if the medical profession and the lay public as well as those persons in this work who have never made a specific study of spastics, will only come to realize that there is a vast difference between mere lack of motor control and definite imbecility, then and not until then will the true value of reclamation of the spastic body be recognized. I have seen many cases so vastly improved by association with, and treatment as, normal beings that the main difficulty is obvious. My word to whomever interested is, in regard to this, belief in the spastic person and willingness to lend a helping hand will prove that a vast number of persons previously relegated to the ranks of imbecility can be reclaimed for a world that direly needs them. We have proven it through Lone Craftsmen work."

CONCLUSIONS AND RECOMMENDATIONS

I have reached some definite conclusions about cerebral palsy which are as follows: (1) Medical science should direct its efforts toward the prevention of this affliction by encouraging research and further experimentation with corrective treatments. (2) Special training during elementary school years that will instill the cerebral palsy victim with the desire and means of acquiring economic security and independence should be provided. This should be a federal responsibility. (3) Closer study should be made of the characteristics of the four types mentioned by Dr. Crothers. Research will reveal that in a great percentage of cases, incarceration in a feeble-minded institution is not only the wrong solution, but a genuine act of cruelty.

To my mind the only really effective type of training or treatment for victims of cerebral palsy is muscle training. The patient should be examined by an orthopedist and enrolled in the nearest workshop that really understands this type of affliction. Some hospitals have the accommodations to present this type of treatment.

In a remote community where such accommodations are not available, a book by Percy Merritt Girard, M.D., *Home Treatment of Spastic Paralysis*, published by J. B. Lippincott Co., will prove extremely beneficial.

As Gaynor once wrote, "You cannot force the growth of human life and civilization any more than you can force these slow-growing trees. That is the economy of Almighty God, that all good growth is slow growth."

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Embryonal Adenosarcoma of the Kidney*

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ONE of the most frequently occurring malignant tumors of infancy and childhood is the rapidly growing neoplasm of the kidney referred to by Birch Hirschfeld¹ as embryonal adenosarcoma and by Wilms² as mixed tumor of the kidney. The first genuine case reported seems to have been that described from the pathological viewpoint by Wollstein³ and from the clinical viewpoint by Abbe.⁴ Since that time many of these tumors have been recognized. The present paper deals briefly with the findings in eight cases observed at the University of Minnesota Hospitals during the past decade. For comparison and for the sake of emphasis, several series of previously reported cases are also presented.

Pathology. Embryonal adenosarcomas are derived from fetal rests and may contain different types of tissue in varying degrees of differentiation. They grow from any part of the kidney and compress the kidney substance, soon breaking through the capsule to infiltrate surrounding structures. They may be hard, or soft and vascular containing many areas of necrosis and hemorrhage. Microscopically, the neoplasms are embryonal in type, containing, most frequently, adenosarcomatous tissue; but smooth muscle, striated muscle, and epithelium are commonly seen.

Incidence. Dean and Pack⁵ in reporting a series of 16 cases from the New York Memorial Hospital for Cancer and Allied Diseases, stated that these tumors represented 0.096 per cent of malignant neoplasms seen in that hospital. Priestley and Broders⁶ reported that such cases comprised approximately 0.007 per cent of all admissions to the Mayo Clinic.

Age and sex distribution. As indicated in Table I, almost all Wilms tumors occur in children under the age of 15 years. In fact, the majority of them appear before the fifth year. Five of the eight cases seen at the University of Minnesota Hospital were in children under 5 years of age, while the other three were in children between the ages of 5 and 10. In Wollstein's⁷ series, more than a third were recognized during the first year of life. Many cases of mixed tumors have been reported as occurring in premature and full-term newly-born infants.^{7,8} On the other hand, Dean and Pack⁵ report that one of their cases was 37 years of age at the time of nephrectomy.

There is no appreciable difference in the sex incidence or in which kidney is affected by the tumor. (Table I.) It has been reported as bilateral in a few cases, but it is difficult to prove that these do not represent a primary tumor in one kidney with metastases to the other. In one of our cases, at operation, a mass was found in each kidney, that on the right being considerably larger and, in all probability, the primary tumor.

Initial symptom. The initial symptom of the tumor is, in the majority of cases (Table II), a slowly enlarging abdomen or a palpable mass first noticed by the parents. Pain is the next most common manifestation. Hematuria is occasionally observed, but it is rarely the first symptom. Hinman and Kutzman⁸ report, in addition to those noted in Table II, initial symptoms in some cases, of vomiting, icterus, diarrhea, constipation, ascites, and cough. In the 17 cases of the Children's Memorial Hospital, Chicago,⁹ palpable tumor was reported as the initial symptom in the majority. Two of the 65 cases reported by Priestley and Broders⁶ presented an unexplained fever, while seven first complained of irritability, anorexia, constipation, and restlessness. Dean and Pack⁵ noted one case with the initial symptom of urinary frequency, while one of the cases in Wollstein's⁷ series first presented a digestive disturbance. Physical examination of this child revealed a palpable mass already present in the abdomen. In one of the cases from the University Hospital, the parents stated that the child had had a slowly enlarging abdomen for one and one-half years, but only in the preceding two weeks had it increased in size rapidly. The phenomenon had been first noticed shortly after birth.

General symptoms. Practically all cases of Wilms tumors show, sometime during the course of the disease, a palpable tumor mass (Table III). Dean and Pack⁵ regard the palpation of a mass as the most frequent and important sign. About one-half the cases reviewed showed intermittent fever at some time, while only 30 per cent complained of pain. Wollstein⁷ states that in her series, pain was either absent or not severe. Irritability and restlessness might well be signs of pain in the younger children. Intermittent hematuria occurred in only about 20 per cent of the cases here reported. This is in direct contrast to the high percentage showing hematuria in malignant kidney tumors (hypernephromas) of the adult. Vomiting, frequent urination, ascites, and constipation occurred in a few of the cases. The general signs of malignancy (anemia, emaciation, general weakness, etc.) undoubtedly occurred in all cases in the terminal stages.

Diagnosis. The diagnosis of Wilms tumor depends upon the history, physical signs (especially palpable mass), cystoscopic examination, and the pyelogram. The cystoscopic examination, with catheterization of the ureters, will usually show a failure of urine secretion on the affected side.¹⁰ The pyelogram will almost always show some deviation from the normal. Kretschmer¹¹ reported recently that all cases in a series of seven showed some change in the pyelogram. The most frequent observation in this series was the failure of the pelvis of the affected kidney to visualize, while the opposite pyelogram was normal. Other cases show filling defects compatible with renal tumor.

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TABLE I.
Summary of Available Data Regarding Age and Sex Incidence and Location of Tumor.

Authors	No. of Cases	Age Incidence (Per Cent)				Sex Incidence (Pct.)		Kidney Involved (Per Cent)		
		Under 5 Yr.	5 to 10 Yrs.	10 to 15 Yrs.	Over 15 Yrs.	Male	Female	Right Alone	Left Alone	Both
Kretschmer	17	70.6	29.4			82.3	17.6	29.4	58.8	11.7
Hinman & Kutzman	341 1000 306	76.3	17.0	2.9	3.8	50.0	50.0	44.4	50.9	4.5
Platou*	16	81.3	6.2	12.5		50.0	50.0	31.3	62.5	6.2
Balfour	8	62.5	37.5			50.0	50.0	50.0	37.5	12.5
Dean & Pack	16		93.7% under 15 yrs. Average: 3 yrs.		6.3	50.0	50.0			
Priestley & Broders	65		97% under 15 yrs.		3.0					
Prather & Crabtree	111		Average age 2.7 yrs.			46.1	53.9			
Wollstein	17		100% under 6 yrs. 88.2% under 3 yrs.			41.2	58.8	52.9	47.1	

*Babies' Hospital, N. Y. C. Personal communication to the author from Dr. Ralph Platou.

The conditions one must think of in the differential diagnosis of Wilms tumor include, mainly, those which present a mass in the abdomen and those with urinary symptoms. Hydronephrosis, pyonephrosis, and polycystic kidney will give symptoms referable to the urinary tract. A palpable mass in the abdomen might be due to retroperitoneal lymph node enlargement, splenomegaly, ovarian cyst, pointing appendiceal abscess, or to tumors of the adrenal gland, liver, or pancreas. However, the history, physical signs, and pyelogram will usually rule out these conditions in the case of a kidney tumor.

Metastases. Embryonal adenocarcinomas of the kidney metastasize early in the disease, but because they also infiltrate so readily, it is difficult to separate metastases from far-reaching infiltrations. Through the renal vein the tumor has been known to extend as far as the heart by continuous growth. The lungs are the most common site of true metastasis, while the liver and opposite kidney are also affected in many cases. The regional lymph nodes are not frequently involved, because the tumor metastasizes by the blood stream. Of the eight cases seen at the University Hospital, six had known metastases. Five of these were in the lungs and were demonstrated by X-ray. The sixth patient developed a large pedunculated tumor of the bladder, which subsequently proved to be a metastasis from the kidney tumor.

Prognosis and treatment. Hinman and Kutzman⁸ in 1924 reviewed 330 cases as to operative mortality and found that 94 patients died, giving a primary mortality of 28.5 per cent. The ultimate mortality (within one and one-half years) in those of this series followed was 80 to 90 per cent. The treatment in these cases had been surgery alone or surgery and deep X-ray therapy combined. All those patients who had received surgery and radiation succumbed, and the authors stated that the use of the Röntgen ray had given but very little encouragement.

Prather and Crabtree¹² in 1931 reported that of 111 cases, 18.4 per cent were dead in one month, 69.3 per cent of the remainder were dead within 15 months, while only 12.3 per cent lived two years or longer. They also

stated that surgery offered the only hope for relief.

In the series of cases reported by Wollstein,⁷ 16 of the 17 patients were operated upon, and in only one instance was the tumor found inoperable. Thirteen cases were traced, and it was found that 10 patients were dead within 15 months. The other three patients were alive and well after 10 months, 6¾ years, and 30 years, respectively.

Dean and Pack⁵ reported the average length of life of 13 patients following nephrectomy was nine months.

Priestley and Broders^{6,13} were able to trace 44 cases of their series and found four patients still living. Of these four, one had received nephrectomy alone over 13 years previously and had no evidence of recurrence. The other three received nephrectomy and radiation. One was living and well three years and three months following operation, and the other two five months following operation. The average duration of life after onset of symptoms of the 40 patients known to have died, varied with the treatment. Thus those in the advanced stage who received no treatment lived, on an average, 3.2 months. Irradiation alone increased this average to 9.2 months, while nephrectomy alone increased it to 10.2 months. In those cases which received the combination of nephrectomy and radiation, the average duration of life following onset of symptoms was further increased to 18.7 months. These authors advise radiation to decrease the size of the tumor, followed by operation and intensive postoperative radiation.

McNeill and Chilko¹⁴ reported a survey of 383 cases in which the mortality rate was well over 90 per cent. They also reported a case of clinically diagnosed Wilms tumor in a boy 14 months of age who received 10,319 R's of deep X-ray over a period of three years with no ill effects. He was alive and well with no evidence of recurrence when the case was reported, 34 months following diagnosis.

All eight cases seen at the University Hospital have been followed. Seven of the eight patients are dead. One is alive and well seven months following onset of symptoms. This patient received nephrectomy with pre-

TABLE II.
Initial Symptom (Per Cent).

Authors	No. of Cases	Tumor Mass	Pain	Hematuria	Ashtenia and Malaise
Hinman & Kutzman	228	59.6	18.4	3.0	4.3
Dean & Pack	16	50.0	25.0	6.2	12.5
Balfour	8	37.5	12.5	25.0	25.0
Priestley & Broders	65	40.5	28.9	17.4	
Prather & Crabtree	111	80.1	5.4	14.5	
Wollstein	17	94.1			

TABLE III.
Important General Symptoms (Per Cent).

Authors	No. of Cases	Tumor Mass	Intermittent Fever	Pain	Intermittent Hematuria
Kretschmer	17	100.0	52.9	35.3	5.9
Hinman & Kutzman	228	90.0		20.0	14.0
Platou	16	75.0	56.2	37.5	18.7
Balfour	8	100.0	37.5	25.0	25.0
Dean & Pack	16		62.5	35.3	31.2
Priestley & Broders	65	98.6	52.2	56.5	43.4
Wollstein	17	100.0			17.7

and postoperative radiation. Of the other seven, one was in the advanced stage on admission and received no radiation or surgery of the kidney tumor. She lived only two months following onset of symptoms. Four cases received deep X-ray therapy alone. Three of these lived an average of 11.1 months after onset, while the fourth lived 33 months after the enlarging abdomen was first noted. The tumor in this patient was comparatively benign, however, as she lived 10 months after metastases to the lungs were first observed. The two cases which received a combination of surgery and radiation lived an average of 9.2 months following onset of symptoms.

Thus, cures of Wilms tumors have been reported by the use of surgery alone, irradiation alone, or a combination of the two procedures. The best therapy at the present time would seem to be surgery and irradiation of those cases where the tumor has not spread beyond the kidney. If the tumor has spread, deep X-ray offers a good palliative procedure and will probably prolong the life of the patient.

SUMMARY

A review of several series of cases of embryonal adenocarcinomas of the kidney is presented.

Eight cases seen at the University Hospital are added.

There is no appreciable difference in the sex distribution or in the kidney affected.

The initial symptom most commonly seen is a palpable mass.

The tumor is almost always palpable at some time during the disease, but hematuria is seen in only about 30 per cent of cases.

The diagnosis is based upon the history, physical signs, cystoscopic examination, and the pyelogram.

Metastases are most commonly seen in the lungs. The tumor metastasizes early.

The best treatment at the present time would seem to be nephrectomy with pre- and postoperative deep X-ray therapy. The prognosis is grave.

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Enteric Intussusception

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INTUSSUSCEPTION is that condition of unknown etiology in which a portion of the bowel invaginates itself into an adjacent part. In a small number of cases tumors or polyps are found at the site of the lesion and show a definite relation to its cause. Such a case is reported by Maisto.¹ When no tumor or polyp is present, no unanimity of opinion exists as to the cause of the intussusception.

The condition occurs most frequently in the ileocecal region and it is here that lymphoid tissue is most abundant in infancy. This thickened lymphoid tissue may simulate a tumor and mechanically give rise to an invagination. Some workers think that there is a temporary paralysis of a segment of the bowel and that peristalsis, above this site, starts the intussusception. Others think that the young child has not coordinated the intestinal tract well and that a minor disturbance may start off the process.

According to Montgomery,² about 80 per cent of the cases occur in the first two years of life. It occurs in boys more frequently than in girls in the ratio of three to one, and usually in healthy infants.

McGlannan³ classifies intussusception into three groups: (1) enteric, (2) enterocolic and (3) colic, the respective incidence being about 80 per cent enterocolic, 10 per cent enteric and 10 per cent colic.

Usually there is only a single invagination. Occasionally, however, there may be a double or even a triple process. Very rarely the invagination may be retrograde. As the infolding process progresses, the mesentery is pulled in and the venous blood supply is compromised. Swelling occurs and increases. Blood extravasates into the bowel lumen, later the arterial blood supply is cut off and gangrene occurs. Peritonitis develops and, if the process has been slow, occasionally it is walled off and an abscess may form or the invaginated portion of gut may slough off and pass from the rectum, an auto-anastomosis taking place. However, by far the most frequent occurrence is a spreading peritonitis and death unless surgical relief is obtained.

The condition usually develops in a healthy, well-developed boy. The first symptom is sudden severe pain in the abdomen. The child doubles up and screams, seeking a comfortable position. He may turn over on his abdomen and assume the knee-elbow position. The cramp will subside only to return in a few minutes and, as the process progresses, pain becomes more severe until peristalsis is weaker. The child becomes pale, there is an anxious facial expression. Later he goes into collapse and notices nothing between pains. Vomiting occurs once or twice in most cases. The bowels move normally early in the attack, later vomiting is more persistent and no fecal material is passed but blood and mucus are

usually expelled from the rectum or may be found on the examining finger. In the enteric type, blood is not found early and is a late sign. In the late stage, the temperature rises, and the abdomen becomes distended due to peritonitis.

Intussusception is the most frequent cause of intestinal obstruction in infants. A child, especially a boy who is well developed and healthy, who suddenly develops abdominal, cramp-like pain and vomiting, makes one suspicious of intussusception. If a sausage-shaped mass is also felt in the abdomen and bloody mucus is found on rectal examination, the diagnosis is almost certain. A flat X-ray plate of the abdomen may give additional information. The small intestine shows the picture of intestinal obstruction, i. e., gaseous distention of loops of small intestine with a lesser amount in the colon. A barium enema usually gives valuable information. This must be used at a very low pressure. The column of barium as it comes in contact with the intussusception shows a concavity, that is, it fits over the mass as a cup. At times the mass is reduced by pressure of the barium enema.

Very rarely an intussusception will unfold itself or the gangrenous portion may slough and be passed from the bowel, an auto-anastomosis taking place (1 or 2 per cent of cases, according to Montgomery⁴). Naturally, the earlier the diagnosis is made and a reduction accomplished, the better the prognosis. Kleinschmidt,⁵ quoting Koch and Oerum, states that in a series of 288 infants, 52 per cent died. If the mass cannot be reduced and has to be resected, the mortality is terrific; Montgomery⁶ states, over 90 per cent.

The treatment is non-surgical and surgical. Before modern surgery, attempts were made to reduce the intussusception by abdominal massage, rectal irrigations, etc. Massage now is considered to be dangerous. Rectal irrigations with water or saline solution is condemned in this country, England and Europe, but Hipsley,⁷ in Sydney, Australia, reports remarkable results from the injection method. If the lesion is less than one day old and is of the ileocolic or colic variety, a barium enema may be given at low pressure and an attempt made to reduce the mass. This is successful many times. However, if there is any doubt as to reduction, the abdomen should be opened and this point determined. It is practically impossible to reduce the true enteric variety by the injection method as fluid does not pass the ileocecal valve readily.

Surgical treatment should be instituted as soon as possible in the enteric type and in the other types if the barium enema is unsuccessful, as the longer surgery is postponed the worse the condition becomes. The child should be given a general anesthetic and a right rectus

incision made. The less manipulation the better, as these children do not stand shock well. The lesion is found and reduced by pushing the infolded intestine out. Very little, if any, traction should be made on the proximal intestine. In the early cases the reduction is usually easily accomplished. However, the later ones may be very difficult or impossible to reduce. Warm saline packs should be placed about the damaged intestine and, if its color and circulation return, it should be put back into the abdomen and the wound securely closed. If reduction is impossible or the intestine is dead, we believe that it should be exteriorized as in the Mikulicz procedure. This procedure is a last resort because of the high mortality associated with it.

The following case is one of the enteric type and because of its rarity we report it.

CASE REPORT

The patient, a boy $4\frac{1}{2}$ years old, was seen on November 15, 1938, because of paroxysmal pain in the abdomen. He had awakened in the morning apparently normal. While eating breakfast, he was seized with severe cramp-like pain in the abdomen. His mother stated he had a bowel movement that morning and passed a small amount of normal stool. Three days previous to onset of his illness, the boy had been given one-half an Ex-Lax tablet because of constipation. This had no effect and was repeated the next day.

The patient was put to bed where he would lie still for a few minutes and then suddenly double up and start to scream because of the abdominal pain. These paroxysms of pain occurred at intervals of two to three minutes. Between the pains the patient would relax and complain only of soreness in the abdomen. The attacks of pain increased in frequency and severity until the boy was screaming with pain about every minute. He was given aspirin by his father who also applied hot packs to the abdomen but which did not give relief. At that time the boy was given a soapsuds enema which was returned clear, and he was also given a dose of milk of magnesia which he promptly vomited. Following the vomiting he seemed relieved for about ten minutes when the attacks of pain again started as severe as before. His temperature at this time was 97.6° .

Physical examination when the boy was first seen, was negative. His temperature remained at 97.6° , and he had vomited only once following the dose of milk of magnesia.

The past history was essentially negative except for chicken-pox at two years of age and a history of mild constipation.

The boy was immediately sent to the hospital, where a flat X-ray plate of the abdomen was taken and a barium enema given. The X-ray report was essentially negative; barium passed through the entire colon and there was no sign of obstruction in the large bowel. The patient had no further nausea or vomiting and a soapsuds enema was given with return of a fairly large amount of formed stool in which there was no blood. The temperature remained normal, white count normal, and urine negative. In spite of the administration of opiates, the patient's condition did not improve. At 5:00 o'clock in the afternoon the child was given chloral hydrate gr. X by rectum. He was quite relaxed following this and abdominal examination then showed a sausage-shaped mass lying transversely across the lower abdomen. This mass could also be felt on rectal exam-

ination. Dr. Chester Stewart was called in at this time and made a diagnosis of intussusception of the small intestine.

The child was taken to the operating room and a general anesthetic administered (drop ether). A right rectus incision about $3\frac{1}{2}$ inches in length, with its mid point opposite the umbilicus, was made. A considerable amount of fluid was present in the abdomen. A dark-colored sausage-shaped mass was easily found. This was composed entirely of small intestine, located apparently about the mid portion of the ileum. The exact site was not located because of the character of the lesion and gravity of the situation. There was considerable edema of the involved intestine and its color was extremely dark. Gentle pressure was applied to the lower part of the intussusception, the first part of the invagination reduced easily, then the reduction became more and more difficult and towards the last it seemed impossible to force the remaining portion out. A longitudinal tear appeared in the serous coat of the intestine about $1\frac{1}{2}$ inches in length. From this tear serous fluid exuded. By applying warm saline compresses, waiting for a short time, and pushing from below again, the reduction was finally accomplished. The entire involved area was wrapped in warm saline gauze packs and rested for about six or seven minutes. On inspection at the end of this time, there appeared several small reddish areas and pulsations could be made out in the involved segment. No polyp or tumor could be felt.

The intestine was returned to the abdominal cavity and a layer-by-layer closure made of the abdominal wall with plain catgut No. 1 single in the peritoneal layer, chromic catgut No. 1 single in the fascia, and dermal used to close the skin. Three tension dermal sutures were placed through the skin and anterior rectus sheath.

The child was returned to his room and was given 1000 cc. of 5 per cent glucose in normal saline solution intravenously. Morphine gr. $1/24$ was given for restlessness and pain. The immediate postoperative condition was good. However, two days later the child developed a pneumonia of the upper right lobe. Sulphanilamide therapy was instituted and two days later the patient's condition was much improved, the temperature ranging from 99 to 100° by rectum. The pulse came down from 140 to 100, respiratory rate from 40 to 24, and an uneventful convalescence followed.

The child was discharged from the hospital on the twelfth postoperative day. Since then he has been in good health and is apparently normal.

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NOTE: Subsequent X-ray examination shows no evidence of polyp or tumor in intestinal tract.

Leukemia in Childhood

An Evaluation of the Present Status of the Problem with Particular Reference to a Study of Cases Treated at the University of Minnesota Hospitals from 1930 to 1938

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THE relative frequency and the inevitably fatal termination of leukemia in childhood makes this disease one of the major problems facing the general practitioner and the pediatricist who usually assume responsibility for the care of children. For this reason it seems desirable to summarize briefly the progress which has been made toward an understanding of the pathogenesis of the disease and the methods of therapy. This paper represents such an attempt.

HISTORY

In 1845 Bennett proposed the term "leucocythemia" and Virchow the term "Leukämie" to designate the disease now regarded as leukemia. Two types were later differentiated and called splenomyelogenous leukemia and lymphatic leukemia. Ehrlich, who introduced the differential staining of leukocytes in 1891, distinguished two types of cells: granular leukocytes of bone marrow origin occurring in splenomyelogenous leukemia, and nongranular cells of lymphatic origin noted in lymphatic leukemia. Naegeli was the first to recognize and describe myeloblastic leukemia. In the early part of this century it was found that leukemia affected the entire body, and that extramedullary metaplasia of myeloid tissue occurs in both physiologic and pathologic conditions. Reschad and Schilling-Torgau described a third common type—monocytic leukemia—in 1913. Fleischmann in 1915 reported the second case but believes that in its terminal stage it changed to a myeloblastic leukemia. Dameshek and others hold to the theory that this third type of leukemia does exist as a definite clinical entity.

DEFINITION

Leukemia is a systemic disease in which the normal mechanism for the production of formed blood elements is permanently impaired, with the appearance in the peripheral blood of abnormal white cells. The two most prominent features are a marked qualitative change in the leukocytes of the blood, and varying degrees of glandular and splenic enlargement. Leukocytosis may be so high that the blood appears to be a grayish red mixture of pus and blood, separating on standing into a lower layer of red cells and an upper buffy layer of white cells. In some cases, or in different stages of the disease, there may be a normal white count or a leukopenia (aleukemic phase). The blood picture is characterized by an abnormal number of immature white cells which have entered the blood stream from the bone marrow,

lymph glands or other hematopoietic tissue before the cells have completely developed. The red cells and the platelets are likewise altered, usually showing a great diminution in number with consequent anemia and thrombocytopenic hemorrhages. In all leukemias there is a marked dysfunction of the hematopoietic system, particularly of the bone marrow. This dysfunction is revealed by the changes in the circulating blood and by the infiltration of various tissues with immature cells.

Great confusion exists in the terminology and classification of diseases of the blood-forming organs. Recently there has been a tendency to use the terms leukosis, myelosis, and lymph adenosis for leukemia, myelogenous leukemia and lymphogenous leukemia, respectively. The term leukemia, like the term anemia, has a strong foothold in medical literature, although literally both are incorrect. Hodgkin's disease, lymphosarcoma and lymphatic leukemia belong to the lymphoma or lymphoblastoma group of diseases. Krumbhaar prefers the name lymphatoid diseases instead of Mallory's term lymphoblastoma for various hematopoietic disturbances.

Leukemia is usually classified on the basis of whether it is acute or chronic, leukemic or aleukemic. Subleukemic is perhaps a better term than aleukemic to designate a leukemia without an increase in the leukocyte count although in each instance there may be any degree of qualitative alteration in the white blood cells. The term aleukemic should be reserved for the condition having leukemic organ changes without a leukemic blood picture. Autopsy in the human subject or experimental animal reveals no anatomic basis for dividing the disease into acute or chronic varieties or into subleukemia or leukemia. In many cases a subleukemic blood picture will eventually become a frank leukemic type. In classifying the predominating type-class, the anatomic name of the strain of cells which play the leading rôle in the leukemic process is generally combined with the clinical terms—as acute lymphocytic leukemia, chronic monocytic leukemia, etc.

In order to indicate the origin of the cells involved, some workers designate the type as myelogenous or lymphogenous. Others who favor the neoplastic theory use the nomenclature for neoplastic diseases—such as leukemic lymphoblastoma or myeloblastoma. The origin of the monocyte is still disputed; hence monocytic leukemia cannot be designated in terms of the origin of the type cell. There are many theories as to its origin; from myeloblasts in the bone marrow, from lymphoid cells, from primitive mesenchyme cells, from fibroblasts,

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TABLE I. CLASSIFICATION OF LEUKEMIA
(Leucemia, Leukosis, Leucocythemia)

Clinical Designation	General Type of Leukemia	Cell of Origin	Specific Type of Leukemia	Synonyms Depending on Common Usage, on Course of Disease, or on Clinical or Hematologic Characteristics
Leukemia or Subleukemic (Aleukemic) Leukemia (Acute or Chronic)	Myelogenous (arising from cells of bone marrow)	Myeloblast	NEUTROPHILIC Leukemia	Myelogenous, myeloid, myelocytic or myeloblastic leukemia; myelosis
			Eosinophilocytic Leukemia	Eosinophilic leukemia
			Basophilocytic Leukemia	Basophilic leukemia
			Chloroleukemia	Chloroma or chloroleukosarcoma
		Myeloblast and megaloblast	Erythroleukemia	Leukemia associated with erythremia
		Megakaryoblast	Megakaryocytic Leukemia	
	Lymphogenous (arising from cells of lymphoid tissue)	Lymphoblast	LYMPHOCYTIC Leukemia	Lymphogenous, lymphoid, lymphatic or lymphoblastic leukemia; lymphoblastoma leukæmicum; lymphadenosis.
			Leukosarcoma	Lymphosarcoma associated with leukemia
	Lymphogenous or myelogenous	Primitive mesenchyme cell	Stem cell Leukemia	Hemohistioblastic, embryonal or lymphoidocytic leukemia
		Plasma cell, myeloblast and lymphoblast	Plasma cell Leukemia	Plasmacytoma with leukemia or multiple myeloma with leukemia
	Disputed	Monoblast	MONOCYTIC Leukemia	Histiocytic leukemia; reticulosis; reticulo-endotheliosis, reticulum cell leukemia; reticulosarcoma

*The common types are given in capital letters.

or from macrophages. Downey believing in the reticulo-endothelial origin of the monocyte has used the term reticulo-endotheliosis as a synonym for monocytic leukemia. Sabin, Dameshek and others support the theory of the existence of monocytes as an independent strain of cells, quite apart from the histiocyte and having a separate cycle of maturation. In recent years leukemic blood leukocytes have been studied by tissue culture in an attempt to determine the origin of the various cell types involved in the leukemias. Nothing definite has as yet been found.

Many combinations of these various terms are in use, but one is seldom consistent in using the same system of terminology for different types of the disease. Forkner suggests a simplified classification including all types of leukemia, dividing them first as to acute and chronic forms, then as to leukemic and subleukemic varieties. Further separation is made depending on the type of cell involved in the leukemic process.

ETIOLOGY

The cause of leukemia is still unknown. Three different concepts as to its nature have been advocated, the neoplastic and infectious having more weight than the theory of heredity.

I. *Theory of Neoplasm.* Some observers claim that the leukemias belong in the group of neoplastic diseases, with close relationship to lymphosarcoma, leukosarcoma and Hodgkin's disease. In 1902 Babes advanced the theory of the neoplastic nature of leukemia, which was

later subscribed to by Ewing and others. Three cases of lymphosarcoma have been reported by Evans and Leucutia, which changed into lymphatic leukemia (leukosarcoma) as soon as the bone marrow became involved by foci of lymphosarcoma. There are many features in leukemia which suggest a relationship to cancer inasmuch as a type of body cell appears to lose its ability to mature. In this respect it is somewhat suggestive of the process which affects the red blood cells in pernicious anemia. Some of the neoplastic characters of the white blood cells in leukemia are:

1. Uncontrolled growth.
2. Tendency to form secondary foci of growth (metastasis).
3. Progress to a fatal termination with cachexia.
4. Neoplastic type of metabolic rate of the cells.
5. Maturation with roentgen ray irradiation.
6. Failure to transmit the disease by inoculation of human beings with the blood of affected patients.
7. Birth of perfectly normal children by leukemic mother.
8. Failure to isolate an infectious agent from leukemic blood or tissues.

The neoplastic theory gains strong experimental support from the laboratory work of MacDowell and Richter and of Furth on the transmissible leukemia of mice. They conclude that leukemia is transmissible in mice only when living leukemic cells are injected into a

susceptible host, and that the nature of the resultant growth is that of a tumor with or without a leukemic blood picture.

Furth, Ferris and Reznikoff claim that leukemia in man is essentially the same disease as that in mice, and that both acute and chronic forms, myeloid as well as lymphoid, are neoplastic. Experimental evidence shows that the leukemic blood cells of mice are malignant, with characteristics of their own, and that leukemia-like carcinoma can be produced by various chemical (benzene, indole) and physical (X-ray) agents. They believe that lymphosarcoma and lymphoid leukemia are related diseases. In experimental lymphoid leukemia in mice, the malignant blood cells may localize as huge tumors (lymphosarcomas), or may diffusely invade the blood-forming tissues but not the blood stream (aleukemic leukemia), or may invade the blood stream as a classic leukemia.

II. *Theory of Infection.* The theory of the infectious origin of leukemia is advocated by clinicians who have noted a similarity in the clinical and pathologic picture to that of an infectious process. This hypothesis is applicable particularly to acute leukemia with its prostration, intoxication, purpura and septic type of fever. The occurrence of leukemia in series suggests a mild, epidemic character. Pierce has reported 41 cases of leukemia in children, in which there was a high incidence of antecedent infection (49 per cent). Ellermann and Furth have shown that experimental leukemia in fowls is due to an infectious agent, by transmitting the disease by inoculations with cell-free filtrates of blood and organs of leukemic chicks. In no other animal has the disease been reproduced without the introduction of living leukemic cells into the host. This conflict in experimental evidence makes one doubt whether leukemia in mice is the same condition as that in fowls. Many workers still believe that the acute and the chronic leukemias are different in character, the acute forms having much in common with infections and the chronic having more similarity to tumors of lymphoid or myeloid tissues. A number of investigators have produced leukemoid blood pictures by inoculating animals with streptococcus and staphylococcus obtained from the spleen and lymph nodes of leukemic patients, but they are not true leukemias.

III. *Theory of Heredity.* The concept that a constitutional inferiority of the hematopoietic organs predisposes to an unstable response to infections is supported by a number of observers. This is suggested by the occurrence of leukemia in families having other types of diseases of the blood-forming tissues, such as anemia, agranulocytosis, infectious mononucleosis, etc. Perhaps there is some factor which regulates the maturation of the granular cells just as the liver fraction seems to control erythropoiesis. One may postulate a deficiency in this regulatory factor due to a hereditary tendency to abnormal toxic reaction in infections, and as a result, a flooding of the peripheral blood with quantities of immature blood cells.

Hereditary factors in experimental animal leukemias are well known. As regards man, the genetics of leu-

kemia have not been extensively studied. Ardashnikov investigated thirty-three family histories and found but three familial cases. Only seventeen authentic instances of familial leukemia are known. The majority of these are of the lymphatic type. There has been no recorded case of the disease in both husband and wife. As a rule, parent and child, or brothers and sisters are affected, three cases in one family being the maximum. Curschmann cites a case of leukemia in a man whose father had died of the same disease nearly fifty years before. These facts are against the theory of common environmental influences including infection, and they favor the hypothesis that heredity is an influential factor in the etiology of leukemia.

PATHOLOGY

Leukemia is considered a systemic disease, beginning as a local process and spreading throughout the body until at autopsy there is wide dissemination. The usual structural changes are those of hyperplasia of the bone marrow and lymph nodes associated with variable degrees of infiltration in the viscera, bones, meninges and skin. The pathologic findings in leukemia are confined chiefly to the blood and the blood-forming organs. They are much the same in the various clinical forms and differ from one another only in degree and in the type of predominating cell found. The marrow, spleen, and lymphatic tissue show the greatest and most constant changes. The normal bright yellow "fat marrow" in the shafts of the long bones is replaced by a grayish pink, firm, homogeneous, markedly cellular tissue. Small islands of active erythropoiesis may be left. Granular myelocytes and polymorphonuclear leukocytes predominate in the myelocytic form, while in the monocytic and lymphocytic types, the nongranular mononuclear cells are most numerous. The lymph nodes and lymphatic tissue vary greatly in involvement, since often most of them are but slightly enlarged. All involved tissues show complete obliteration of their normal architecture, the tissue being replaced by fibrosis and a diffuse mass of immature cells, either granular or mononuclear, which are large with pale staining nuclei and many mitotic figures.

It is said that any organ or tissue except teeth and nails may be infiltrated. In acute leukemia hemorrhages are common in the skin, in mucous and serous membranes and in the ocular fundi. The spleen is always enlarged, sometimes to enormous proportions. Its normal shape is preserved; its consistency is firm and the edges are sharp. The pulp and vessels are crowded with abnormal cells of the predominating type. The malpighian bodies are obliterated by myeloid cells in the myelocytic type, while the pulp is packed with lymphoid cells in lymphocytic leukemia. Cellular infiltration is seen frequently in the liver, kidneys, pancreas, and adrenals, and to a less degree in the skin, nervous system or smooth muscle. Bone lesions include subperiosteal infiltration, generalized or localized osteoporosis, irregular cortical absorption and softening without compression of the spine, and fractures in the long bones, which must be differentiated from hyperparathyroidism, erythroblastic anemia, and metastases from neuroblastoma. The skull, spine, pelvic bone and upper ends of the femora and

humeri are most frequently involved. Falconer and Leonard in a series of cases in the lymphomatoid group of diseases report the incidence of pulmonary involvement as follows: Hodgkin's disease, 31 per cent, lymphosarcoma, 36 per cent, and lymphatic leukemia, 30 per cent.

INCIDENCE

Leukemia occurs in many animals, particularly in fowls, and to a less extent in horses, cattle, dogs, pigs, rats, and mice. In man the incidence has been variously estimated as occurring in from one to three cases among every 1000 hospital admissions. Race, country, occupation and season play no important rôle. Leukemia occurs with varying frequency at any time during life. Acute leukemia is chiefly a disease of childhood and early adult life, commencing usually before 25 years of age. Chronic myelogenous leukemia is more frequent in the fourth and fifth decades, and chronic lymphatic leukemia in the sixth and seventh decades. It has been found that about 70 per cent of all cases are under 30 years of age, and 55 per cent under 20 years. Males are more subject to leukemia than females—in the proportion of two to one. The course of the disease is identical in the two sexes. The disproportion in sex incidence does not apply to children up to 5 or 6 years.

Lereboullet and Baize in a review of 113 cases of acute leukemia in children less than 16 years of age report a high incidence in infancy, 25 in the first year and 64 during the first four years, but this decreased strikingly after the age of 4. They had several congenital cases in this group. In Cooke's series of 50 children with acute leukemia, the age distribution in boys is about the same up to 15 years but the girls show a decrease after the age of 6 years. In his group of 142 cases of leukemia of all ages, the average age of acute leukemia patients is less than 20 years; for those with chronic myelogenous leukemia, 40; and for those with chronic lymphatic leukemia, 57 years. Chronic myelogenous leukemia was more frequent than any other single type during adult life; in childhood he had only three cases.

SYMPTOMS

I. *Acute Leukemia*—with or without leukocytosis. The first clinical manifestation of acute leukemia is ease of fatigue. Increasing pallor soon develops, and it may be several weeks before a physician is consulted for these complaints or for some other more alarming symptoms. At times the patient becomes ill with dramatic suddenness as occurs in an infection, with high fever, chills, vomiting, joint pains, apathy and lemon yellow pallor, followed soon by ulcerative stomatitis, multiple hemorrhages and splenomegaly. There is individual variation but in most cases there is an insidious onset with loss of weight, progressive anemia, weakness, waxy pallor, skin hemorrhages, fever and enlarged spleen. These cardinal signs of leukemia lead one to suspect the diagnosis, but this must be confirmed by the hematology or sternal puncture. The symptoms are protean and, as a whole, fall into four groups:

1. Those associated with an increase in the basal

metabolic rate (nervousness, profuse perspiration, loss of weight).

2. Those associated with infiltrated organs and glands (pressure symptoms, arthralgia, stomatitis, cyanosis, cough, hemoptysis, hematemesis, constipation, diarrhea, melena, frequency of urination, etc.)
3. Those associated with anemia, thrombocytopenia, and myocardial insufficiency (hemorrhages, dyspnea, palpitation, edema, fatigue, hemic cardiac murmurs).
4. Those associated with abnormal metabolism following the gradual progress of the disease (cachexia).

Hemorrhages are the rule. The most common sites are the mucous membranes of the mouth and nose. Severe epistaxis may be the initial symptom. Purpuric cutaneous lesions occur in multiple petechiae or ecchymoses, usually on the trunk or extremities. There are often hemorrhages in the gastro-intestinal or urinary tract, in the vagina or into the joints. Tonsillectomy may cause fatal bleeding. Retinal hemorrhages are considered by some clinicians to be pathognomonic of leukemia. Swelling and ulceration of the gums, cheek, and tonsils in many cases progress to form necrotic, gangrenous lesions. Mediastinal enlargement of the thymic area may cause early symptoms such as dyspnea from pressure on the trachea.

Hyperplasia of the hematopoietic organs is almost always present, being noted particularly in the lymph nodes and spleen. The cervical nodes are generally enlarged, and sometimes are the first to attract attention. The enlargement is usually slight, the nodes being small, firm, palpable, and discrete. The anterior cervical group is more frequently involved and may show visible tumors. In a few cases the submandibular glands may attain huge size causing marked cervical deformity. In the child splenomegaly is more constant than in the adult. The spleen is firm, smooth and somewhat tender to palpation, in the majority of cases not reaching the umbilicus, but occasionally filling more than half of the abdomen. The liver is generally hypertrophied, but to a less extent than the spleen. Leukemic infiltration of the stomach has been described (Rigler). Rheumatoid pain may play a prominent rôle and may be the initial chief complaint. Continued fever occurs, frequently becoming high and septic in type toward the end of the disease. At times abdominal pain simulates appendicitis; leukemic infiltration and perforation of the appendix have been noted at autopsy.

Schwab and Weiss report 334 cases of acute leukemia, 20.5 per cent of which had extra-ocular neurologic signs. Nervous manifestations may assume the form of facial paralysis, Jacksonian epilepsy, convulsions, exophthalmos, meningeal irritation, and deafness. Cerebral hemorrhage is a most serious complication leading to death in a few hours. Other symptoms occur, such as profound anorexia, nausea and vomiting, vertigo, dyspnea, infiltrating skin nodules (leukemia cutis) and sanguineous pericardial effusion. Due to infiltration of the kidneys with embryonal cells, albuminuria and hematuria occasionally

occur. Common to all leukemias is an excess of uric acid and purine bases in the urine, each tending to parallel the destruction of the leukocytes.

II. *Chronic Myelogenous Leukemia*. Chronic myelogenous leukemia is relatively rare in children, usually occurring in later childhood, but presents essentially the same picture as in the adult. Ease of fatigue, progressive loss of weight and strength, and an increase in the size of the abdomen due to the characteristic enormous enlargement of the spleen are early manifestations. The spleen is generally not tender but causes pain in a certain number of cases. The liver is moderately enlarged. In contrast to lymphatic leukemia, there is little gross hypertrophy of the lymph nodes. Following an insidious onset, the course is gradual and there is usually little discomfort for several weeks or months. Pains in the extremities are not uncommon. In the later stages, there are hemorrhages from the mucous membranes rather than into the skin as noted in acute leukemia, particularly from nose, gums and rectum. Hemorrhage or leukemic infiltration may cause Ménière's syndrome, if in the labyrinth; dimness of vision, if in the retina or optic nerve; or exophthalmos, if in the orbit. A marked rise in the basal metabolism is found, up to 40 to 50 per cent above the normal. Febrile attacks occur but the elevation of temperature is not as high as in acute leukemia. Among the later symptoms are anemia, dyspnea, abdominal distress, edema, ascites, and occasional priapism. Skin lesions are relatively rare in myelogenous leukemia.

III. *Chronic Lymphatic Leukemia*. Chronic lymphatic leukemia does not occur in childhood. It is much less common than the myelogenous variety. The general symptoms closely resemble those of myelogenous leukemia and only examination of the blood can differentiate them. The most conspicuous feature is enlargement of the lymph nodes, cervical, axillary, inguinal, and mediastinal; these are firm, discrete, non-inflammatory, and painless. The spleen and liver are not as large as in myelogenous leukemia. Hypertrophied tonsils may be an early symptom associated with weakness and anorexia. Leukemides and specific cutaneous lesions (leukemia cutis) are frequent. In the terminal stage one sees cardio-respiratory and digestive symptoms with profound anemia.

IV. *Monocytic Leukemia*. Since Dameshek reviewed the literature and reported ten cases of monocytic leukemia in 1930, others have increased the list. Recently Klumpp and Evans added eight, and in 1937 Osgood described six new cases, making also an analysis of 127 previously reported. These workers believe monocytic leukemia is a relatively common condition. Rosenthal found only 2 per cent in 455 cases, while Doan, using his more sensitive supravitral staining technique, estimates it at 15 per cent in his series of 75 cases of leukemia. The general opinion prevails that the incidence of each type of leukemia at all ages combined is approximately that of the particular cell types in the normal differential count from a blood smear: an average of 66 per cent myelogenous leukemia, 25 per cent lymphatic, and 5 per cent monocytic.

Monocytic leukemia is an acute type with a short clinical course ranging from one month to two years. It differs little clinically from the other acute leukemias except in age limits. The ages of those reported have ranged from 1 to 78 years, with the majority around 40 years. It is characterized by an abrupt onset of oral symptoms in 60 per cent of the cases, marked tendency to swelling of the gums, and the frequent association of stomatitis, fever, and hemorrhages from the mucous membranes. The liver and spleen are usually enlarged, but the lymph nodes are less involved than in lymphatic leukemia. Progressive pallor and weakness parallel the degree of anemia and thrombocytopenia with its hemorrhagic diathesis. Less frequent symptoms include pain in bones and joints, cutaneous papules and nodules, and monocytic infiltrative tumors. Haining reports a case of monocytic leukemia with intestinal obstruction due to infiltration. Secondary staphylococcus infection of the skin with furunculosis and carbuncles is not uncommon. The course of this disease is progressively downward. Osgood suggests that the term monocytic leukemia be used in preference to reticulosis or reticulo-endotheliosis.

V. *Other Types*. Chloroma or chloroleukemia, at first thought to be a distinct disease, is now considered a modified form of leukemia. It is a disease with localized tumor masses of greenish color, always associated with myelogenous leukemia. All the characteristic findings of leukemia are present: symptoms, blood picture, and infiltration of organs; and, in addition, the local tumor-like infiltration. These multiple tumors have a predilection for periosteum and dura, the skull bones—especially the orbits, being most frequently involved. Pressure symptoms from the mechanical effect of the tumors are in evidence. The green pigment in the tumors is apparently a lipochrome and contains iron. Kandel has reviewed 175 cases found in the literature and reported three more.

Congenital leukemia is a rare occurrence. Only 30 known cases of leukemia complicated by pregnancy have been found. Recent cases during pregnancy are described by Mehta and by Erf and Fine. Abt cites six cases in the newborn period, one of which was in a stillborn infant in the seventh month of gestation. Leukemia, however, is not transmitted from mother to child. Leukemic mothers give birth to normal children. In no authentic case has leukemia been found in the offspring of leukemic mothers. Leukemia in the neonatal period must be differentiated from erythroblastosis neonatorum and congenital syphilis.

Plasma cell leukemia is reported occasionally, associated often with multiple myeloma. Plasma cells resemble other leukocytes in potentialities for leukocytosis, infiltration, tumor formation, and leukemic infiltration. Stem cell leukemia is a term applied when very immature cells predominate. Lymphosarcoma associated with leukemia is known as leukosarcoma. Erythroleukemia is a rare type of leukemia accompanied by polycythemia. Many observers believe that leukemia and polycythemia rubra vera are closely related, the latter sometimes changing into a leukemia.

BLOOD PICTURE

I. *Acute Leukemia*. The morphologic characteristics of the blood picture of acute leukemia are:

1. Abnormal nongranular mononuclear cells, 80 to 95 per cent of leukocytes regardless of total count (leukocytosis or leukopenia).
2. Agranulocytosis, granular cells only 1 to 15 per cent of white cell count: myelocytes, immature neutrophilic polymorphonuclear cells (juvenile and staff type) and segmented cells.
3. Anemia with frequent red counts of 1,000,000 and a hemoglobin content of 20 per cent. Anemia usually secondary in type, but may resemble pernicious anemia, especially when there is leukopenia. Occasionally normoblasts, megaloblasts and reticulocytes during rare temporary remission.
4. Thrombocytopenia, below 150,000, and often below 100,000; with prolonged bleeding time, normal clotting time and poor retraction of clot.

The number of circulating leukocytes is greatly variable during the course of the disease and in different patients, ranging from 250 to 1,000,000 per c.mm., the average being from 20,000 to 200,000. In a few days' time the count may drop from 100,000 to 6,000, or suddenly rise to that extent in another case. There may be normal white cell counts, or the so-called subleukemic leukemia (with leukopenia) may have counts less than 5,000 for long periods. These leukemias constitute a diagnostic problem, but the stained blood smear sooner or later will usually show the typical abnormal nongranular cells. These stem cells or undifferentiated cells are large, round or oval elements, having a large, irregular, eccentric nucleus with a narrow border of hyaline protoplasm. Stained by the Giemsa method, the nucleus is pale violet with a fine chromatic structure and contains vacuoles and a deeper stained nucleolus, while the cytoplasm is deep azure. There has been considerable controversy concerning these abnormal agranulocytes—whether they originate in the lymphatic tissue and are lymphoid in origin or whether they come from the bone marrow and are therefore myeloid. The peroxidase reaction is not successful in identifying myeloid cells by the presence of granules since the true myeloblasts, like the lymphocytic series, are peroxidase negative. These nongranular leukemic cells show an increase in protease, as do the myelocyte and polymorphonuclear leukocyte, while lymphoid cells do not possess this proteolytic activity. This fact leads one to believe that these stem cells are myelogenous in origin.

II. *Chronic Myelogenous Leukemia*.

1. Leukocytosis of 40,000 to 500,000, usually over 200,000.
2. Predominant cell: mature polymorphonuclear leukocyte—with 10 to 30 per cent myelocytes, and 10 to 25 per cent juvenile and staff cells. 95 to 99 per cent of white blood cells are of myeloid origin. Eosinophilia occasionally 50 to 80 per cent ("eosinophilic leukemia").
3. Anemia moderate at first (red blood count: 2,500,000 to 3,000,000); more marked in later

stages, and improved during spontaneous or therapeutic remissions.

4. Platelets usually increased.
5. Peroxidase test positive only for myelocytes up through mature polymorphonuclears.
6. Indophenol blue synthesis test positive (Kracke).
7. Increase in protease.

There is no other disease in which so many different types of cells are seen in the blood smear.

III. *Chronic Lymphatic Leukemia*.

1. Leukocytosis of 40,000 to 500,000, usually over 100,000.
2. Extreme lymphocytosis with 90 to 99 per cent small lymphocytes. Smudge forms constant.
3. Anemia less marked than in other types. Red blood count may be normal in early stage.
4. Thrombocytopenia marked.
5. Peroxidase test negative.
6. Indophenol blue synthesis test negative.
7. No protease.

IV. *Monocytic Leukemia*.

1. Leukocytosis usually up to 320,000, but white blood count may go as low as 600.
2. Predominant cell: monocyte and promonocyte (50 to 75 per cent).
3. Red blood count markedly decreased in terminal stages.
4. Thrombocytopenia toward the end.

There seems to be an inverse relationship between the degree of monocytosis and the duration of the illness. In the fulminating cases, the number of monocytes in the peripheral blood is great, or else rapidly increases to high levels, while in the slowly progressing cases, the absolute number of monocytes is only moderately elevated.

DIAGNOSIS

It is difficult to separate the acute or chronic leukoses on a clinical basis. Although usually associated with splenomegaly or lymphadenopathy from which the diagnosis is suspected, leukemia cannot be differentiated until a hematologic examination is made. The diagnosis of leukemia can usually be made from the blood count and, what is more significant, from the blood smear. Until recently leukemia was regarded as a disorder characterized by a persistent increase in the number of white blood cells. According to the present conception of the disease and the recognition of subleukemic states, an increase in the number of white cells is not an essential diagnostic factor. The most reliable criterion for the diagnosis of any leukemia is a preponderance of immature cells regardless of the total number. The difficulty in diagnosis is due to the many variations that may occur both in the clinical picture and in the laboratory observations.

Without a careful blood examination, leukemia may readily be mistaken for other conditions because of the initial symptoms in mouth and throat, fever and hemorrhagic tendency. These lead one to think of diphtheria, ulcerative stomatitis, scurvy, purpura hemorrhagica, and endocarditis. When leukocytosis is present, as

in the majority of cases, leukemia may come first to mind. Leukopenia, however, may mark the entire course of the disease, or be present in certain phases. Abt has listed two groups of differentiation in leukemia in childhood.

Group I. Differentiation when Leukocytosis Is Present.

- A. Nonleukemic conditions simulating leukemia.
 1. Pertussis.
 2. Pneumonia.
 3. Sepsis.
 4. Von Jaksch's pseudoleukemic anemia.
 5. Cooley's Mediterranean erythroblastic anemia.
 6. Infectious mononucleosis.
 7. Mediastinal tumor (thymoma or lymphosarcoma).
 8. Niemann-Pick's essential lipoid histiocytosis.
- B. Leukemia simulating other conditions, such as:
 1. Mediastinal tumor.
 2. Rheumatism.
 3. Diarrhea.
 4. Parotitis (Mikulicz's disease).

Group II. Differentiation when Leukopenia Is Present.

- A. Nonleukemic Conditions Simulating Leukemia.
 1. Sepsis with leukopenia.
 2. Agranulocytosis.
 3. Gaucher's disease.
 4. Aplastic anemia.
 5. Malaria.
 6. Nonlipoid splenohepatomegaly; Letterer-Siwe's disease.
- B. Aleukemic leukemia simulating other conditions, such as:
 1. Sepsis.
 2. Appendicitis.
 3. Aplastic anemia.

After careful weighing of the clinical findings and of the blood picture, diagnosis may still be uncertain. Roentgenograms may be of material assistance where there are bone lesions. Prominent signs of some leukemias may be pain in the long bones as in osteomyelitis; pain around joints resembling acute rheumatic fever; periosteal reactions as in scurvy or luetic periostitis; spontaneous fractures in local osteolytic processes; bulky tumors of single bones; chloroma; or osteolytic lesions, as in multiple myeloma. One case of unusual interest was reported by Clark, in which the roentgenogram revealed a marked disturbance of the calcium content of the bones of the entire skeleton, particularly in the pelvis and femora. The blood calcium was found to be 19.3 mg./100 cc. and persisted at high levels until the end. This was attributed to leukemic infiltration of the parathyroid gland. Biopsy of an enlarged lymph node may assist in the differentiation but it is often impossible to tell from a histologic preparation of a lymph node alone whether one is dealing with a leukemia, lymphosarcoma, leukosarcoma, or Hodgkin's disease. The architecture is destroyed by an invasion of small lymphocytes so that biopsy gives no clear picture of any certain disease.

Of major importance in the diagnosis of leukemia is the sternal puncture. Simultaneous studies of the bone

marrow and the circulating blood in living subjects is a relatively recently developed diagnostic procedure. The peripheral blood often fails to furnish accurate information concerning underlying abnormalities in the blood-forming organs. Changes at the sources of blood cells are probably visible earlier than in the blood, and distinguishing characteristics of different pathologic states may be seen in the bone marrow. Kingery has published a report of 15 ambiguous cases in which sternal puncture has furnished information of noteworthy diagnostic accuracy, which blood examination or biopsy of a node was unable to give. They describe their technique with a spinal needle. It is simple, applicable to ambulatory patients, and free from unpleasant symptoms or sequelae. The positive value of sternal puncture is in the various types of leukemia, while its negative value is in Hodgkin's disease and lymphosarcoma. It must be emphasized that sternal biopsy will not always settle the diagnosis. At one level the bone marrow may appear normal, although at another level it may be hyperplastic.

Dameshek's sternal method is the trephining technique. While the hematopoietic pattern can be better identified, the technique is more complicated, and there is the possibility of postoperative hemorrhage.

The criteria for diagnosis of leukemia from a sternal puncture are as follows:

1. Lymphatic leukemia—	
lymphocytes	20%
or large lymphocytes	5 to 20%
2. Myelogenous leukemia—	
premyelocytes	20%
or myeloblasts	4%
Suggestive of myelogenous leukemia—	
premyelocytes	10 to 20%
or myeloblasts	2 to 4%
Nucleated cells in normal bone marrow	70,000/c.mm.

Splenic puncture is seldom used as a diagnostic tool. Weil believes that it should be done more frequently, the chief contra-indication being a hemorrhagic tendency. It is done with a needle under local anesthesia; splenic pulp is aspirated and spread on slides for staining. The splenogram gives much the same picture that the marrow puncture does. It may be a guide to prognosis and treatment, more than 20 per cent of primitive cells indicating a grave outlook and therapy not indicated. Splenic puncture is not without risk, there being a 1 per cent mortality from postoperative hemorrhage.

Leukemia should be differentiated from the various conditions associated with localized or generalized lymphadenopathy. Lymphocytic leukemia is in many ways similar to Hodgkin's disease and lymphosarcoma, but the blood picture generally is sufficient to differentiate it. Hodgkin's disease, more prevalent in the second and third decades, produces progressive painless enlargement of a group of nodes, which remain firm, discrete and free from suppuration and adhesions. Lymphosarcoma, occurring in the age limits from 25 to 55 years, may involve any lymphoid tissue. Accessible involved nodes

show unilateral or unequal disturbances, almost bony hardness, early fusion between nodes, and adhesions to adjacent tissues. The nodes are not tender and do not suppurate, but they cause serious pressure symptoms. Tuberculous cervical adenopathy is characterized by inflammatory reaction with tenderness, edema, suppuration, fusion of nodes, adhesions to the skin and underlying tissues and X-ray evidence of calcium deposits. Mikulicz's disease is a disease with chronic, symmetrical, painless enlargement of the lacrimal and salivary glands, which is not leukemic.

A number of diseases have been mentioned with leukemoid blood pictures but without tissue changes. Others that may be included are smallpox, chronic infection such as tuberculosis, hemolytic icterus, polycythemia vera during anemic phase, pernicious anemia, Banti's disease, active regeneration following anemia or severe hemorrhage, certain chemical poisoning as arsenic, mustard-gas or mercury, and malignant tumors of the lymphoid system. With regard to the latter, it may be said that in true leukemia, there is a disturbance of all the elements of the blood, while in blood dyscrasias based on tumors of the lymphoid system, tumor cells are present but the rest of the cellular elements are not affected.

Acute leukemia may be confused with acute benign lymphadenosis or infectious mononucleosis. Both are diseases of childhood or young adults. Both are characterized clinically by a sudden onset, high fever, generalized adenopathy and acute pharyngitis and tonsillitis. The blood count reveals an absolute lymphocytosis. In 1923 Downey and McKinlay reported nine cases of benign lymphadenosis with criteria for differentiating it from leukemia and for separating the various types of the atypical lymphocytes found in the blood. They are described as highly differentiated, mature, "leukocytoid" lymphocytes. Paul and Bunnell in 1932 found that the heterophile antibody reaction is positive in infectious mononucleosis and negative in other lymphadenopathies. Weinstein and Fitz-Hugh confirmed this in 16 cases of leukemia in which the heterophile antibody titer was uniformly at a low level.

THErapy

Marked improvement in the clinical condition of the leukemic patient with decrease in organ enlargement and reversal of the blood status toward the normal may occur in three ways. It may come about spontaneously without apparent cause; it may result from intercurrent acute infection; or it may follow therapeutic effort, particularly X-ray irradiation.

Clinicians have noted for a long time that intercurrent infections during the course of leukemia are associated with a decrease in the number of leukocytes. In the last decade artificial production of fever by malarial inoculations has been studied with variable reports as to the effective response. In most of the cases the fall in the white blood cells was quite transitory.

The medical literature abounds in suggestions regarding effective medicinal measures. Leukocytolysis, or reduction in the number of white blood cells, may be accomplished by several methods: chemical, biologic, or

physical. Numerous remedies have been tried for leukemia before irradiation. Since the etiology is still obscure, no specific remedy is known, and the treatment is essentially symptomatic. The chief purpose is to produce (1) improvement of general condition by rest, diet, and sedatives; (2) increase of strength and efficiency by blood transfusions and roentgenotherapy.

Among the many therapeutic substances that have been advocated are lead, arsenic, antimony, sulphur, iodine, benzol, quinine, malarial inoculations, liver extract, ventriculin, embryonic extract (fetal liver), tuberculin, and nuclein. Many of these are toxic and their use entails considerable risk; few of them afford much palliation.

1. *Chemical Therapy.* Before the advent of the roentgen rays the method of treatment in most common use was with arsenic in the form of Fowler's solution. After the general introduction of irradiation, arsenic fell into relative disuse, but recently attention has once more been called to its value in chronic myelogenous leukemia by Forkner. It has practically no influence in chronic lymphatic leukemia. In 1936 Stephens and Lawrence reported seven cases of chronic myelogenous leukemia treated with prolonged courses of potassium arsenite. To be effective, the drug should be given in rapidly increasing doses until toxic symptoms appear, then continued in amounts as large as can be tolerated, a regime which can be maintained for over a year without serious reactions. They conclude that arsenic is an effective palliative especially when accompanying or alternating with radiotherapy. Kandel and LeRoy also find that arsenic therapy and X-ray treatment are not antagonistic, and that a remission of the leukocytosis may be induced with arsenic as soon as the postirradiation decline of the leukocyte count ceases. The toxic reactions of inorganic arsenic are either transient, mild symptoms (conjunctivitis, coryza, nausea, diarrhea) or the more serious complications (polyneuritis, cirrhosis of the liver with ascites, cutaneous pigmentation and painful plantar and palmar hyperkeratoses). Organic arsenicals (arsphenamine) are more dangerous and have produced little improvement in the leukocyte count.

Benzol has had a somewhat similar history as arsenic, but has not regained its early favor. Von Korányi (1912) introduced this drug in the treatment of leukemia. It is ingested in large doses in capsules. Improvement of the general condition is dependent upon reduction in the excessive number of leukocytes. Its administration must be discontinued if the red cells decrease to below 2,000,000. Benzol is contra-indicated in albuminuria, in anemia, in toxic effects on the liver and kidneys, and in hemorrhages due to thrombopenia. Its effects are less easily controlled than those of arsenic, and aplasia of the red bone marrow is a theoretic, if not an actual danger. Antimony and other drugs have produced similar remissions, but their employment has been disappointing and far inferior to irradiation for that purpose.

2. *Biologic Therapy.* Leukocytolytic substances have been demonstrated in leukemia. An antileukocytic serum produced from leukemic white blood cells has been used

in cases of leukemia but the beneficial response is only transitory.

3. *Physical Therapy.* Radiotherapy, although not curative, is undoubtedly of the greatest therapeutic value in chronic myelogenous and chronic lymphatic leukemia. Irradiation is slightly more efficacious in relief of symptoms in the myelogenous variety. It is generally conceded that radiation therapy is without symptomatic effect in the acute cases, the disease progressing rapidly toward the fatal end. Because roentgen irradiation, even in small doses, has been followed by an increase in toxicity and rapid death, its use is usually contra-indicated in acute leukemia. Rosenthal and Harris, however, disagree with this verdict. Since the roentgen ray was first tried in leukemia by Senn in 1903, its use has enjoyed increasing and justifiable popularity.

Radium, in the form of surface application or packs, was first used when deep X-ray therapy was not available, or in patients unable to be moved from their homes. Although large quantities of radium are required and its application presents difficulties, in recent years it has become more widely used. Leucutia reports good results with radium packs in leukemia. Fricke (1928) showed definite and impressive palliation with radium therapy in 157 patients. More recently Fricke and Watkins presented 16 cases of unusual borderline types of leukemia, many with leukopenia. They believe that radium is the most satisfactory therapeutic agent in these obscure cases with low leukocyte counts. Roentgenotherapy covers a larger portal and the effect of the treatment is usually too sudden and drastic.

Roentgenotherapy is now accepted by the majority of clinicians as the therapeutic method of choice in the treatment of chronic forms of leukemia for producing temporary remissions which may persist for some months or even years. No definite plan of treatment can be outlined in advance; the patient must be considered as an individual, and the therapy repeated according to his response. The marked radiosensitivity of leukemic tissue, particularly in children, and the lability of the blood count necessitate extreme caution. Since leukemia is incurable and palliative radiation must be continued for long periods, marked reactions should be avoided and the radiation must be the smallest amount that will produce beneficial results. Small fractional treatments are tolerated better than larger ones. The doses and intervals between radiation must be determined by the patient's condition and a careful check of the blood count. It is unnecessary, even harmful, to attempt to reduce the leukocytes to normal or below normal. Symptomatic relief and general improvement may be accomplished with the white cell count around 10,000 to 30,000. There is always the hazard of a secondary aplastic anemia. Too vigorous therapy may precipitate the same condition observed in the terminal stage of the disease when anemia and thrombopenia become the dominant features. A sudden drop in the leukocyte count may be followed by a clinical aggravation or even by cachexia.

Further treatment is guided by the activity of the leukemia, controlled by periodic blood examinations and a strict surveillance of the patient's general condition.

Anemia is no contra-indication to roentgenotherapy. As soon as there is a change in the blood count, quantitative or qualitative, an increase in the mediastinal shadow, a recurrence in the enlargement of spleen or lymph nodes, a rise in the basal metabolic rate or deterioration in the physical state, irradiation is repeated. A number of remissions may be produced in this manner, but gradually the therapy becomes less effective, and as the disease progresses, it shows complete resistance to therapy.

There is virtual chaos concerning the technique of irradiation. The areas to be irradiated are a subject of controversy. Leucutia in a review of 2725 cases and personal observation of 129 has concluded that, in view of the fact that palliation is all that can be produced and that some effect may be expected from every radiation, the technique is not of such paramount importance. There have been good results claimed from medium penetrating rays with larger doses, from harder rays with smaller fractionated doses, and from radium packs, whether irradiation is made over spleen, lymphatic system in lymphatic leukemia, long bones in myelogenous leukemia, great vessels of the chest, bones of the thorax, kidneys, entire trunk, or even over the entire body in the form of teleroentgenotherapy. David believes that the therapeutic agent should directly attack the centers of cells proliferation and advocates first treating the bone marrow (vertebrae, ribs, scapulae, sternum and long tubular bones), later applying roentgen rays to the spleen and peripheral glands.

Craver prefers the Heublein method of prolonged low intensity irradiation of the whole body—over a period of two to thirty days in a ward where the entire bodies of four patients can be irradiated simultaneously with the tube at some distance. Treatment is given for sixteen to twenty hours daily. Enlarged spleens in myelogenous leukemia should be irradiated locally preliminary to teleroentgenotherapy. Langer, who emphasizes the importance of the vegetative nervous system in the production of leukemia and related diseases, recommends roentgen treatment over the vegetative nervous system with small fields instead of using teleroentgenotherapy.

The leukemic patient should receive supportive treatment of various kinds. His feeling of well-being depends to a large extent upon the state of the red cells and hemoglobin. Results of X-ray therapy are greatly improved when massive doses of iron are administered throughout the course of the illness. In marked anemia and tendency to hemorrhage multiple transfusions are indicated for temporary amelioration, but they have no effect on the circulating leukocytes or in altering the course of the disease. Liver extracts, ventriculin and various extracts of spleen have been used with but minimal response. Nucleotide, which has a favorable effect in stimulating the production of granular leukocytes in certain types of agranulocytosis, has been of no value in the treatment of subleukemic leukemia.

Israëls in 1935 studied the effect of Lugol's solution in chronic lymphatic leukemia. Although in some cases the iodine cause a reduction in the white cell count, the failure of symptomatic relief, the lack of improvement

in the anemia when present, and the uninterrupted course of the condition suggest that the leukemic process itself was unaffected. Isaacs believes that Lugol's solution has a definite effect, especially in chronic lymphatic leukemia, in relieving some of the symptoms associated with a high basal metabolic rate.

Operative procedures are contra-indicated because of the low resistance to infection and the bleeding tendency. A rapid exodus is apt to follow dental extraction for removal of foci of infection. Tonsillectomy and splenectomy are of no value, and even hasten the fatal termination, especially in acute leukemia.

PROGNOSIS

Acute leukemia is invariably fatal in a few weeks or months, all treatment being of no avail in affecting the rapid course of the disease. Although the ultimate prognosis in chronic leukemia is bad, and no instance has been reported of recovery in a case in which the diagnosis of leukemia was unquestioned, treatment such as arsenic or radiation therapy may produce temporary remissions for many months or years. Forkner (1937) has reviewed the subject of spontaneous remissions and reported cures of leukemia. One remarkable feature of leukemia is the great variation in the length of its course. It may be fulminating or greatly prolonged and relatively benign. Occasionally myelogenous leukemia lasts for ten years or more, but a long course is more common in lymphatic leukemia. Treatment cannot extend the clinical course of chronic leukemia beyond a certain limited period, but it vastly improves the quality of life remaining to the patient and promotes his activity and happiness. The improvement in the general condition after a course of X-rays is usually dramatic. The disease, however, always proceeds by exacerbations and remissions to a fatal termination. The immediate prognosis may be estimated with some accuracy by observing the effects of treatment of the hemoglobin and erythrocytes. A steady rise gives a good immediate prognosis, while a fall indicates the probability of an early fatal issue.

Nathanson and Welch (1937) in a report on life expectancy and incidence of malignant disease estimate that 50 per cent of the patients with acute leukemia are dead in two months, 75 per cent in six months, and the remainder within a year. The average survival in chronic lymphatic leukemia is 3.45 years. In 96 cases of acute and chronic lymphatic leukemia, only 18 per cent were living five years after onset. In 141 cases of acute and chronic myelogenous leukemia, 22 per cent were living after a five-year period. Isaacs also has found that the average duration of life in chronic leukemia is about 3½ years. Leucutia claims that radiation therapy increases the expectation of life very little, perhaps adding about one-quarter to one-third of the usual duration without treatment. It is said, however, that the patient's working efficiency is increased at least 60 per cent throughout the entire course of the disease as a result of radiation therapy.

ANALYSIS OF LEUKEMIA PATIENTS ADMITTED TO THE PEDIATRIC SERVICE IN THE UNIVERSITY OF MINNESOTA HOSPITALS, JANUARY 1, 1930, TO MAY 23, 1938

The following analysis includes all available case records of leukemia in children up to the age of 16 years, admitted to the Pediatric Service in the Minnesota University Hospitals from January 1, 1930, to May 23, 1938. In some instances comparison is made with similar studies of other observers.

CLASSIFICATION

The cases reviewed in this series fall into the following classification. Diagnosis was established in 58 per cent of the cases by autopsy findings. The remaining cases were diagnosed by clinical signs and blood examination.

TABLE II.

	No. of Cases	Per Cent of Total No.
Acute Lymphatic Leukemia (Lymphocytic)	31	77.5
Myelogenous (Neutrophilic)	5	12.5
a. Acute—2 cases		
b. Chronic—3 cases		
Reticulo-endotheliosis (Monocytic)	2	5.0
a. Reticulosarcoma—1 case		
b. Leukemic Reticulo-endotheliosis—1 case		
Atypical	2	5.0
Total	40	100.0

ETIOLOGY

a. Yearly Incidence.

TABLE III.

Year	No. of Cases
1930	2
1931	2
1932	1
1933	5
1934	3
1935	7
1936	9
1937	8
Jan. 1 to May 23, 1938	3
Total	40

b. Age and Sex Incidence.

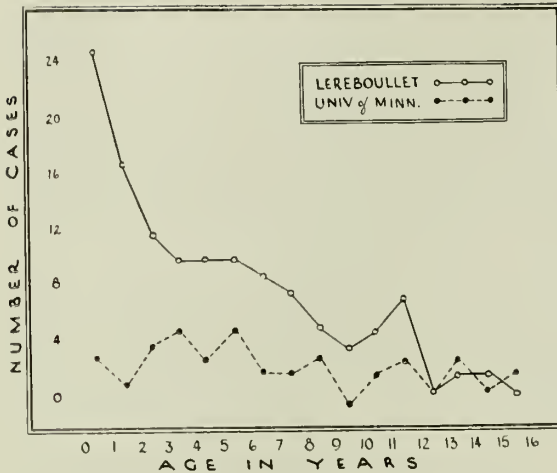
TABLE IV.

Age (Years)	No. Males	No. Females	Total
0 to 1	2	1	3
1 to 2	1	—	1
2 to 3	3	1	4
3 to 4	3	2	5
4 to 5	2	1	3
5 to 6	3	2	5
6 to 7	2	—	2
7 to 8	1	1	2
8 to 9	2	1	3
9 to 10	—	—	—
10 to 11	2	—	2
11 to 12	1	2	3
12 to 13	—	1	1
13 to 14	2	1	3
14 to 15	1	—	1
15 to 16	2	—	2
Totals	27	13	40

DIAGNOSIS

TABLE V.

Youngest case—Atypical Leukemia	2 months
Oldest case—Leukemic Reticulo-endotheliosis	15½ years
Average age for entire group	6.56 years
Percentage of cases under 6 years	52.5%
27 cases occurred in males and 13 in females (ratio approximately 2:1).	



A comparison of our findings regarding age incidence of the entire group is made with that of P. Lereboullet and P. Baize.

c. *Predisposing Factors* (questionable).

1. *Family History.* The family history was reported in 38 of the 40 cases. With one exception there was no blood dyscrasia in the family.
2. *Previous Infectious Diseases.* Eleven cases (27 per cent) of the group had a history of an infectious process shortly preceding the onset of the first manifestation.

TABLE VI.

Type of Infection	No. of Cases
Pneumonia	3
Pertussis	3
Otitis Media	3
Pyuria	1
Upper Respiratory Infection	1

SYMPTOMATOLOGY

a. *Initial Manifestations.*

Comparison is made with the results of a corresponding study of 50 cases of acute leukemia reported by J. V. Cooke (see Table VII).

In addition to these initial manifestations many of the patients developed some of the following symptoms before hospitalization: fever, epistaxis, general glandular enlargement and buccal bleeding.

Ramsay (1927) considers the chief symptoms of leukemia to be fever, large abdomen, skin hemorrhages, epistaxis and buccal bleeding.

b. *Duration from onset of first manifestation to hospital admission* (see Table VIII).

DIAGNOSTIC PROCEDURES

a. *Blood Findings.*

The average blood pictures at the time of hospital admission are compared with the findings of Ramsay (1927). Ramsay's cases are all under 8 years of age. (Tables X and XI).

b. *X-Ray Findings.*

Diagnostic X-ray procedures were used in 80 per cent of the group; of these, 22 per cent had negative X-ray

findings. X-rays of a leukemic nature included bony rarefaction, splenomegaly, leukemic bone infiltration, lung infiltration, mediastinal nodes, hepatomegaly, enlarged kidneys, abdominal ascites and thymic enlargement. Fifty-six per cent of the cases with positive X-ray findings received autopsy confirmation, while in 36 per cent of the remainder postmortem examination was not made.

c. *Biopsy Studies.*

Biopsy studies were made on 10 cases, 12 specimens being obtained. All but one of these cases subsequently died while in the hospital. Six of the biopsies gave positive diagnostic information: two from cervical lymph nodes, three from axillary nodes and one from a skull tumor. Indeterminate results were obtained from the following biopsies: two from inguinal lymph nodes, and one each from axillary node, bone marrow, pleural fluid, and leg tumor.

COURSE OF THE DISEASE

Eleven patients were discharged from the hospital. One case of chronic myelogenous leukemia (Neutrophilic) is being followed regularly in the Outpatient Department, receiving deep X-ray therapy as indicated, and showing satisfactory progress. The remainder comprise eight cases of acute lymphatic leukemia and two cases of chronic myelogenous leukemia. One case of acute lymphatic leukemia of two months' duration has just been discharged from the hospital with a hopeless prognosis. Follow-up information has been obtained from the family or the attending physician in eight of the other discharged cases—death having occurred in each.

For the entire series the average number of days' duration from onset of the initial symptom until death was 145 days in acute leukemia and 1277 in chronic myelogenous leukemia.

Autopsy Findings.

Twenty-three cases (58 per cent of total number) were subjected to postmortem examination. Anatomical changes observed at necropsy were quite similar in all types of leukemia. The essential difference was primarily one of degree and type of predominating cell found.

More than half of the cases showed multiple hemorrhagic areas, and leukemic infiltration of liver, kidney, and spleen. Eight had bone marrow involvement and six pulmonary infiltration. There were five reports of generalized lymphoid hyperplasia. Occasional cases showed leukemic infiltration of heart, thymus, or adrenals; and one case was characterized by multiple tumors.

SUMMARY

Leukemia is a systemic disease in which the normal mechanism for the production of formed blood elements is markedly impaired. Although a definite etiology remains obscure, concepts of its neoplastic and infectious nature seem more tenable than does that relative to its hereditary origin. Characteristically, the acute form occurs chiefly in childhood and early adult life, affecting males twice as frequently as females. Pathological

TABLE VII.

Symptoms	U. OF M. HOSPITAL SERIES				COOKE'S SERIES	
	Lymphatic Leukemia		All Cases		No. of Cases	Pct.
	No. of Cases	Pct.	No. of Cases	Pct.		
Asthenia	2	6.4%	4	10.0%	17	34%
Pallor	13	41.9	13	32.5		
Rheumatoid pains	5	16.1	7	17.5	5	10
Cervical Glandular Enlargement	4	12.9	5	12.5	9	18
Large abdomen	1	3.2	3	7.5	1	2
Skin hemorrhages	1	3.2	2	5.0	7	14
Localized swelling	2	6.4	2	5.0		
Cough - dyspnea	1	3.2	2	5.0	5	10
Anorexia	1	3.2	1	2.5		
Abdominal pain	1	3.2	1	2.5	2	4
Stomatitis					2	4
Neuropathic symptoms					2	4
	31 Cases		40 Cases		50 Cases	

TABLE VIII.

Diagnosis	No. of Cases	Shortest Period (Days)	Longest Period (Days)	Average Period (Days)
Acute Lymphatic (LYMPHOCYTIC)	31	4	210	63
Myelogenous (NEUTROPHILIC)				
a. Acute	2	21	42	31.5
b. Chronic	3	120	821	384
Reticulo-endotheliosis (MONOCYTIC)	2	6	35	20.5
Atypical	2	16	60	38
Entire Series	40	4	821	81.8

TABLE IX. PHYSICAL FINDINGS ON HOSPITAL ADMISSION

Analysis of Physical Findings	DEGREE				Cases in Which Present	Pct. of Occurrence
	Slight	Moderate	Marked	Extreme		
Pallor	—	14	15	3	32	80%
Splenomegaly	4	14	11	2	31	78
General gland enlargement	9	17	3	—	29	73
Hepatomegaly	—	21	6	—	27	68
Cervical gland enlargement	4	14	5	—	23	58
Enlarged tonsils	—	12	2	1	15	38
Skin petechiae	2	8	3	—	13	33
Buccal bleeding	2	5	—	—	7	18
Stomatitis	1	4	2	—	7	18
Localized swelling	1	4	1	—	6	15
Retinal hemorrhage	—	1	1	—	2	5
Scalp tumors	—	1	—	—	1	3

TABLE X.

Blood Analysis	No. of Cases	Lymphatic Leukemia 31 Cases	Myelogenous Leukemia 5 Cases	Reticulo-endotheliosis 2 Cases	Atypical 2 Cases	Grand Average
Hemoglobin	40	36.8%	47%	66%	83.5%	41.56%
Erythrocytes	36	1,741,212	2,320,000	2,750,000	—	1,880,000
Leucocytes	40	61,426	158,983	7,600	6,525	69,601
Polymorphonuclears	40	17.8%	39.6%	30.0%	41.8%	21.84%
Lymphocytes	38	78.7%	29.3%	71.5%	38.0%	70.49%
Monocytes	38	1.4%	1.0%	2.0%	—	1.22%
Myelocytes	38	0.3%	13.7%	—	—	2.09%
Promyelocytes	38	—	7.5%	—	—	1.0%
Metamyelocytes	38	—	5.3%	1.0%	—	0.76%
Immature or atypical cells	29	24.7%	14.5%	Present	Present	22.62%
Stem cells	38	—	3.5%	—	—	0.53%
Reticulocytes	15	2.9%	2.0%	—	—	2.93%
Platelets	30	101,768	97,533	81,500	—	99,993

TABLE XI.

Blood Analysis	Ramsay Myelogenous Leukemia 19 Cases	Ramsay Lymphatic Leukemia 70 Cases
Hemoglobin	31.8%	31%
Erythrocytes	2,114,800	1,946,000
Leucocytes	139,020	210,245
Polymorphonuclears	38.7%	
Lymphocytes	25.0%	
Myelocytes		
Promyelocytes		
Metamyelocytes	32.0%	

changes are found mainly in the blood and blood-forming organs, but other organs frequently show extensive leukemic infiltration.

Symptoms of four general types occur in the acute form: (1) those associated with disturbances in metabolism; (2) those which are secondary to the infiltration of various organs; (3) those related to anemia, thrombocytopenia, and myocardial insufficiency; and (4)

TABLE XII.
Mortality in Hospital and Duration from Onset.

Type of Leukemia	Deaths		Days Duration		
	No.	Pct.	Maximum	Minimum	Average
Lymphatic (LYMPHOCYTIC)	23		273	20	109.7
Myelogenous (NEUTROPHILIC)	2		135	48	91.5
a. Acute	2		—	—	—
b. Chronic	—		—	—	—
Reticulo-endotheliosis (MONOCYTIC)	2		64	—	64.
a. Reticulosarcoma	1		—	12	12.
b. Leukemic Reticulo-endotheliosis	1		—	18	—
Atypical	2		171	—	—
Entire Series	29	72.5%	272	12	114.7

abnormal metabolism following gradual progress of the disease.

The characteristic blood picture for each type is presented. In general, the incidence of each type of leukemia is approximately that of the particular cell types in the normal differential count of a blood smear.

Sternal puncture may be of importance as a diagnostic procedure in the absence of positive blood findings. Lymphatic node biopsy has little value as a means for diagnosis in about one-half the cases.

Specific therapy is yet unknown. The trend at present, however, is to (1) improve the general condition by rest, diet, and sedatives; and to (2) attempt to increase the patient's strength by blood transfusions and roentgenotherapy.

The prognosis remains hopeless. A rapid or delayed termination may result. In cases of the latter, recurrent exacerbations and remissions until death usually occur.

A detailed analysis of cases observed at the Minnesota University Hospitals from January, 1930, to May 23, 1938, is given.

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The Effect of Obstetrical Analgesics on the Infant

Clinical Observations of 188 Cases

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IN the last few years, an increasing demand for the lessening of pain in childbirth has been placed on the obstetrician. There has been considerable difference of opinion as to whether present day analgesic agents are harmful to the child. W. W. Bell in March, 1937, reported a series of 441 cases in which 225 patients were given scopolamine and 216, nembital. His report showed that in the 225 patients who had scopolamine there were three unaccountable deaths, and that no harmful effects were obtained from the use of nembital.¹ S. F. Moore and R. A. McCurdy of Western Reserve University in 1936 reported 150 cases in which paraldehyde was used in conjunction with barbiturates in which there were no maternal or neonatal deaths.² DeLee in *The 1937 Year Book of Obstetrics* said that more women will suffer permanent damage and more babies will, likewise, with the use of these analgesics.³

It was with this statement in mind that we decided to follow a series of babies in our practice for a considerable length of time to see if there were any later effects upon the infants. We have used several combina-

tions of drugs since 1935, but for the past three years we have confined ourselves to the use of a combination of nembital, paraldehyde, and nitrous oxide gas analgesia. We first used the combination of paraldehyde and nembital as described by Rosenfield and Davidoff.⁴ The dose recommended by these men varied from 6 to 13 grains of nembital along with 6 to 12 drams of paraldehyde. This dosage varied with the individual cases. In our series the dosage was somewhat reduced. We used from 4½ to 7½ grains of nembital, from 3 to 5 drams of paraldehyde, and nitrous oxide gas. We had a somewhat lower response as far as the analgesic effects were concerned, but this lower dosage almost completely eliminated the requirement of any resuscitation of the infant. In this series of 188 cases, 74 per cent experienced complete amnesia, 21 per cent partial amnesia, and 5 per cent were failures. Out of 188 babies, 181 cried immediately and required no resuscitation, five, or 2.3 per cent, required mild resuscitation. The only resuscitation used in these infants was gentle slapping, and 10 per cent carbon dioxide, and 90 per cent

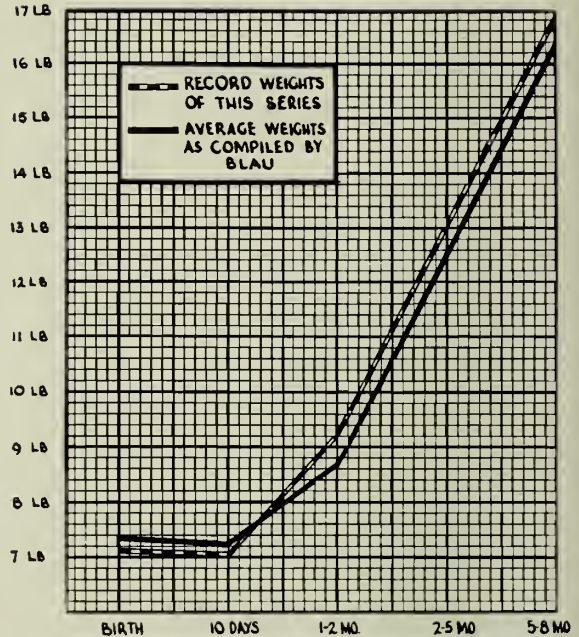
oxygen gas. In these five babies, the cord was around the neck twice, and it is a question whether the oligopnea was produced by the anoxemia due to the cord about the neck, or by the analgesia. I believe that the cord about the neck was the cause of the trouble, as we have had the same experience where no analgesic agent was used.

One case required considerable resuscitation. The mother had a particularly difficult labor which lasted 20 hours with extreme molding of the head; no instruments were used. When it was seen that the labor was going to be quite difficult, additional doses of nembutal and paraldehyde were stopped and the mother was fully conscious at the time of delivery. This child was quite apathetic the first four or five days and had several convulsive seizures. The child nursed very poorly the first week. He was put in an incubator, and oxygen was administered continuously. Subcutaneous fluids were given repeatedly. The convulsions stopped on the fifth day. This child is quite bright; he sat up of his own accord at 7 months, was able to stand at 11 months, and could talk sufficiently well at 13 months to make short sentences. The child at this writing is 15 months old and has been entirely free of convulsive seizures.

One baby in our series was stillborn. The mother was two weeks past the expected date of confinement and X-ray revealed a large head which was out of proportion to the pelvis. We had advised caesarean section, but this was refused. The mother was in labor for five hours with very hard pains. The head was extremely molded. No instruments were used.

In the 188 cases in this series, including the five that required immediate mild resuscitation, the infants nursed readily, were not apathetic or listless, cried lustily and responded as normally as did the infants in whom no analgesic agent had been given to the mothers. The weight gain curve for the ten-day stay in the hospital of our series of infants corresponded favorably with the weight gain curve of an equal number of infants in the hospital in which the mothers received no analgesic whatsoever.

In starting our study, we originally had 300 obstetrical patients and nembutal, paraldehyde, and nitrous oxide were used in the dosages previously mentioned. We had to eliminate 112 cases from our series, because of failure of the mothers to return for monthly check-ups on their infants. We also found it difficult to get the parents to bring the children in on an exact date, so we found it best to compile our chart with the following subdivisions:



Graph of Compiled Data

birth weight, weight at 10 days (the usual time of leaving the hospital in our cases), weight at 1 to 2 months, weight at 2 to 5 months, and from 5 months to 8 months.

Our plan is to follow these children over a period of several years to see if any noticeable effects develop at a later date. As can be seen from the graph, our infants' weight gain over the period of study, corresponded very favorably with the normal weight gain as compiled by the charts of Doctor Blau. In fact, our infants are slightly above the average. In compiling the time at which our group of children first recognized their mother and reached for an object, we find that they are well within the normal limits.

We find in conclusion that, as far as our study goes, there are no harmful effects, either mental or physical, that can be ascertained by clinical observation, to the infants whose mothers have had nembutal and paraldehyde and nitrous oxide gas in the doses we have mentioned.

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Pneumonia in Childhood

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THIS paper presents the results of a questionnaire sent to a number of physicians relative to the diagnosis and treatment of pneumonia in children. A survey of this character, which constitutes a heart-to-heart chat with 68 physicians as to what they are actually doing, should be of interest. The physicians who supplied the data used in this paper are practicing in the eastern section of South Dakota. A review of these letters proved to be a pleasure, indeed, and I only regret that all cannot read them.

The survey disclosed that the majority agree with the general idea that during childhood there is more bronchopneumonia than lobar pneumonia, but that a true ratio of the two conditions cannot be stated because of mistaken diagnosis, differences related to age, etc. The relative frequency with which the diagnosis of each of these two conditions was considered overlooked is indicated in the following table.

Do Many Cases Go Undiagnosed?*

	YES	NO
Bronchopneumonia	39	16
Lobar Pneumonia	31	25

*In this and following tabulations the figures indicate the number of physicians who replied to a questionnaire.

There can be no doubt that a large number of cases of pneumonia are undiagnosed. According to the replies received to the questionnaire, this applied particularly to bronchopneumonia. One justification of the statement that many cases of pneumonia are not recognized lies in the number of surprises revealed by the X-ray. This method of examination often reveals consolidations which are not accompanied by definite clinical and physical signs.

The results of inquiry relative to the use of local applications to the chest in cases of pneumonia are shown in the following table.

Do You Employ?

	Oil or Grease	Mustard Plasters	Pneumonia Jackets
YES	30	33	44
NO	14	20	33

For at least twenty years these procedures have been largely discarded by children's hospitals and by many physicians, but for some reason teachers and writers are fearful of omitting to mention that light oils, poultices, and jackets may be employed to ease pain and lighten the attack. The arguments against their use are well known and I suspect that many more physicians than

indicated in the poll, do employ them solely to satisfy the relatives, rather than to aid the comfort of the child.

It is not strange in the practice of medicine generally and specifically here in the treatment of pneumonia, that forms of conduct, methods, and even superstitions handed down through the ages, continue with so powerful an influence. It is certain that the present generation of parents, who think they survived the ills of their own childhood largely because of steaming fumes of animal fats, vegetable oils, body odors, and even of asafetida, are not likely to discard them easily. However, a large number of parents readily accept the new teaching and welcome the idea of fresh, light, dry, and clean bedding for their sick children. Two physicians with large country practices noted amusing contrary opinions on the question of greasing the chest. One, with marked brevity said, "Yes, because it keeps off onions"; and the other with abhorrence stated, "Absolutely no. In a country practice keep off such dirt and grease." It was a surprise to find so many physicians discarding the use of mustard plasters, which in my opinion do have some merit. Several added favorable mention of diathermy.

The following table indicates the results of inquiry relative to the use of X-ray therapy in pneumonia.

Do You Use X-ray Therapy?

YES	NO
1	38

A striking fact here is that only one physician who replied employs X-ray therapy, although a large number of them undoubtedly are equipped to do so. Several explanations for the one exception may be implied—one probably being that it represents "action" to a family suddenly concerned about a very sick child, and so in spite of added expense, the countryside is soon talking about the wonderful value of the X-ray in pneumonia. A survey of the literature does not convince one that it has any proven advantage for the pneumonia patient.

Do You Use?

	Steam Inhalations	Cold Air	Fresh Air. (warm. moist)
YES	53	19	42
NO	5		

Steam inhalation is overwhelmingly the choice of all. It is indeed a sane remedy, but physicians should not cease to caution against the danger of scalding or burning children associated with this procedure.

Do You Use Serum?

YES	NO
26	27

This survey indicates a most watchful interest in serum therapy. The direct question was probably misconstrued by many, because it is hardly possible that the facilities for typing and for early diagnosis can be available to so many as to permit the correct use of serum. One physician noted that he had used serum for 20 years without a single fatality and several spoke of the routine use of vaccines, antitoxins, antigens, phylacogens, and "edwenil". Because of the relatively low mortality of pneumonia in childhood and the favorable course it usually runs, all this sort of therapy should be withheld until definite value has been proven. The use of antipneumococcic serum, though of accepted value in pneumonia in adults has not played much of a rôle as yet in the pneumonias of childhood, probably on account of the difficulty in getting the early type determination so necessary for this specific therapy. The method of administration of sera is not easy, nor do such injections add to the rest and comfort of the patient.

An objection may be made here to teaching centers which send men to meetings who extol some new form of treatment and state that such a method is in vogue at their institution, without making it clear that its use is solely for the purpose of evaluation. To be specific, we may ask if the physician from Harvard, talking before the Texas Medical Association, stated the conservative facts as to the preventive and curative properties of M B 693, though the Associated Press featured the story over the country in no uncertain way. It is not right for us to play upon the hopes and emotions of sick people, and abuse the confidence of the public in the medical profession. Most physicians know that the use of this drug is being rigidly controlled for the definite determination of its value and use, and we may hope that such study may be continued to a successful end.

Relative to serum therapy of pneumonia in children, much experimental work remains to be done. Early typing of pneumococci is essential and it is difficult to obtain sputum from the child, although it was thought for a time that typing could be done from cultures of the nasopharynx, larynx, or stomach contents; it was found later that the organism in sputum or blood may not be of the same type. There is no specific serum available for bronchopneumonia, due to organism other than pneumococci, but it has been well established that when the type is correctly determined in the lobar pneumonia of children, and the serum given promptly, early recovery follows. When given late, no beneficial effect is noted. Again, it must be remembered that many cases of lobar pneumonia make spontaneous recovery without serum or any specific treatment. Of present interest regarding serum treatment is the statement of the New York City Health Department in their February Quarterly Bul-

letin, to the effect that they are doubtful of its real value. This was partly based upon the great drop in the mortality rate in New York City, because now the same distinct drop is seen from the rates over the nation.

DRUGS: Do You Use?

	YES	NO
Quinine	15	37
Sulfanilamide	29	29
Coal Tar Derivatives	20	37
Opium	44	10
Barbiturates	13	47

Quinine has had a long and varying record as to its preventive and curative powers. Most present-day workers regard its value as doubtful and place it still on the experimental list. In view of the reluctance of large pneumonia centers to drop it entirely, the above tabulation is surprising in showing so many individual men in the field who have definitely discontinued its use.

Sulfanilamide, on the other hand, is a new drug that is still in the experimental class but one that has been quite generally accepted. I doubt if it is to our credit to rush in with a drug of this kind, with its known and attendant harmful effects, and use it in these children who are ill with a more or less benign disorder.

A drug which promises much but which is still under strict study, is a new sulfanilamide derivative—M B 693 or sulfapyridine. More experimental data is necessary to confirm glowing advance announcements.

Sedatives. Of admittedly prime importance is the comfort of a pneumonia patient. There may have been some misunderstanding again as to the meaning of these questions, because it is a surprise to find so many physicians not using these drugs. Aspirin and phenacetin usually give relief, even against pleuritic pains, and when used should be accompanied by alkalis or citrates.

In the poll, opium finds great favor and codeine espe-

Supportives and Stimulants Used:

	YES	NO
Alcohol	17	40
Digitalis	29	30
Strychnine	9	47
Camphor in Oil	14	43
Caffeine Sodium Benzoate	27	30
Nitroglycerine	5	49
Atropine	18	36

cially is most efficacious. Morphine should not be used in cases of depressed respiration where breathing is an effort. Chest binders, but not adhesive, sometimes help, as do hydrotherapy and oxygen.

The survey shows that these drugs are used by a minority of the physicians who replied. Some doctors commented upon the importance of digitalis. My own experience has been that digitalis is useless except for patients who had cardiac disease previous to the onset of the pneumonia. I was surprised to note that alcohol was not in common use.

SUMMARY AND CONCLUSIONS

A questionnaire was sent to 68 physicians in eastern South Dakota inquiring as to their opinions and prac-

tices in certain pertinent phases of pneumonia in childhood. The replies are summarized and commented upon.

The predominant opinion of these physicians is definitely for rest, quiet, good nursing care and supportive measures in pneumonia in childhood. They emphasize the danger of overtreatment with many of the formerly accepted therapeutic procedures. Likewise, a warning is voiced against readily accepting newer methods of treatments until their worth is well proven. This in no way discourages continued study of and experiment with every reasonable measure having any likelihood of lessening the severity, complications or mortality of pneumonia in childhood.

NOTE: I wish to thank most sincerely all who replied to the questionnaire.

Hypertrophic Pyloric Stenosis

A Review of 100 Cases

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FOR many years I have been interested in hypertrophic pyloric stenosis, and after having operated 100 patients for this condition it is my privilege to present this clinical review.

Much has been written on hypertrophic pyloric stenosis, and the development of the medical and surgical aspects of the disease has been particularly intriguing. As early as 1777 Armstrong described the necropsy findings of a case. The first case reported in this country was by Beardsley in 1841. Siemon and Dawosky reported the first case in Germany in 1842 and were the first observers to call attention to the projectile type of vomiting. Landerer, in 1879, first used the term, "congenital pyloric stenosis." Hirschsprung in 1888 presented the clinical findings and created modern interest in this disease of infants.

All the babies suffering from this condition previous to 1893 were treated medically. It was in this year that Cordua performed the first operation for this pathological entity, a jejunostomy, but the patient died. Finkelstein first called attention to the palpable tumor in 1896. In 1898 Willy Meyer operated on two patients, doing a gastro-enterostomy, and both died. Stern, of Germany, did a gastro-enterostomy the same year and lost his case. By 1904 Shaw and Elting found records of 39 operated patients with only 17 recoveries; curiously enough, only five had been done in this country.

As late as 1908, Fredet and Dufour collected published results in 135 operations and showed a mortality

of 50 per cent. These results led Huebner and Pfaundler in Germany and Hutchinson in London to express themselves as being against operation for this condition. In the next few years Scudder, Downes and Richter, in this country, obtained better results, but the mortality was still so high that physicians were hesitant about referring their patients for operation.

Rammstedt in 1913 reported a case, upon which he did his now familiar muscle-splitting operation, and the patient recovered. He urged that this type of operation be used to replace gastro-enterostomy, divulsion, and pyloroplasty, then in vogue. Two very important factors in favor of his operation were that (1) the stomach was not opened and (2) the operative time was considerably shortened. In 1908, Fredet devised a muscle-splitting operation, and after taking a "V" out of the pyloric muscle converted the longitudinal incision into a transverse one, but it was not until Rammstedt brought forth his operation that improvement in operative results began to be recorded.

Holt in 1920 gave the following results previous to the Rammstedt regime.

RESULTS IN 135 OPERATIONS

	Cases	Recoveries
Gastro-enterostomy	52	22
Divulsion	35	21
Pyloroplasty	22	13
Various modifications and combinations	26	12
	135	68

Mortality approximately 50%—After Holt.

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RESULTS OF MEDICAL TREATMENT AND THE OLDER AND THE MORE RECENT SURGICAL TREATMENT

	First Period, 1901-1911			
	Cases No.	Recov. No.	Died No.	Mort. Pct.
Without operation	24	10	14	58
Operation (gastro-enterostomy)	17	7	10	58
Total	41	17	24	58
Second Period, 1912-1914				
Without operation	7	3	4	57
Operation:				
(Gastro-ent. 24, Rammstedt 6)	30	17	13	43
Total	37	20	17	45.9
Third Period, 1915-1916				
Without operation	2	1	1	50
Operation (Rammstedt)	61	47	14	23
Babies Hosp.—Holt	63	48	15	23.8

RAMMSTEDT'S OPERATION AT BABIES HOSPITAL

	Cases No.	Deaths No.	Mortality Pct.
	Prior to 1915	6	2	33
1915	35	10	28.5
1916	26	4	15.3
Total	67	16	24

Three patients died from gastro-intestinal conditions subsequently (4 weeks, 6 weeks, 7 weeks); one died from empyema (3 months) and one from pneumonia (4 months); 46 have been followed and are well to date.—HOLT.

After 1917, Rammstedt's operation was the only one ever performed for this condition at the Babies Hospital in New York.

There has been nothing new advanced regarding the etiology of the condition since the original theories of Hirschsprung, Holt, Downes, Still and others. We appreciate that it is a congenital condition, but what relationship, if any, exists between hypertrophy and spasm still remains in doubt. The theories which have been advocated are purely of an academic nature and I can see no reason why they should produce a great deal of argument. The important thing regarding this disease is its early recognition, and the institution of proper treatment.

I feel that if anything has been learned from a review of these cases it is the belief that the most successful treatment of true hypertrophic pyloric stenosis is surgical.

The pathology in the pylorus is limited to the circular muscle fibers, which are markedly hypertrophied. The size of the tumor encountered at operation, does not bear any relation to the severity or duration of the symptoms. In the tumor of moderate size, the tissues are usually not friable and very little hemorrhage is encountered. The large tumors usually present very friable tissues, and in many instances there occurs hemorrhage which must be controlled.

The history usually reveals a healthy, well nourished, breast-fed infant who suddenly, about the third week of life, begins to vomit. The vomiting persists, usually after every feeding, and within a few days becomes projectile in character. Shortly the weight loss becomes noticeable, the infant becomes dehydrated, urine becomes scanty and bowel movements are very small or

absent. The baby presents no fever, and the appetite is unimpaired. This characteristic vomiting, in most instances, starts about the third week of life. In this series, one case started at the sixth week and another at the eighth week, but this is very exceptional. During the first week of illness, gastric peristalsis becomes visible. It simulates a golf ball passing along under the skin, from left to right, and is best observed immediately after feeding.

Palpation of the pyloric tumor is a valuable diagnostic aid, and should be searched for when the stomach is empty. Some observers state that they have palpated the tumor in 100 per cent of their cases. I cannot be in accord with this observation as I was unable to palpate the tumor in over 33½ per cent of these cases. One must necessarily agree that palpation of the tumor is of value, but I do not consider it essential in making the diagnosis. Given the above clinical picture, the diagnosis should not be difficult. Rarely is the X-ray of any benefit, but in doubtful cases it should be used to rule out congenital anomalies of the esophagus and duodenum. It has been my experience that if barium is given before operating it clings to the mucosa of the stomach and pylorus and makes the feeding problem more difficult for a few days.

In reviewing these cases, one is struck by the fact that in every instance where we have had a true hypertrophic pylorus, medical management has been of no avail. We should not procrastinate with these infants, permitting them to go way beneath their birth weights. Their resistance is lowered to a minimum and any mild respiratory infection is apt to cause death.

It has been very interesting to observe the changes in the pre-operative preparation of these infants. Downes in 1920 was still doing an occasional emergency operation on these babies, with the result that in 175 cases, he had a mortality of 17.1 per cent. He reported that death was due to collapse. He felt that 150 cc. to 200 cc. of hypodermoclysis increased the tendency to bleed. As time passed, surgeons began to realize that the preparation of these infants for surgery should be done in conjunction with pediatricists, if the best results were to be obtained. We learned that this is never an emergency operation, and before any operative procedure is done, at least 24 to 48 hours must be spent in an attempt to restore body fluids, and blood chemistry levels. Experience has taught that feedings should be continued to within six to eight hours of operative time. Subcutaneous fluids, either normal saline or Hartmann's Solution, should be given two or three times before operating. The amount given at one time will vary from 150 to 250 cc. This is a life-saving measure for the infant and is probably the most valuable procedure in pre-operative preparation. If the condition of the patient is poor, hypodermoclysis should be given just before the operation and repeated on the return from surgery. One must be careful not to give too much parenteral fluid and waterlog the patient. The rapidity with which it is absorbed is the guide as to time and amount to be given. I have not found the postoperative hypodermoclysis

necessary very often. Intravenous glucose was never resorted to in this series and I do not feel that transfusions are necessary either pre- or postoperatively unless hemorrhage comes into the picture. In these cases, transfusions were never used.

Just before taking the baby to the operating room, wash the stomach until the fluid is returned clear. Wrap the infant in cotton-batting to prevent loss of body heat, and keep warm while operating with hot water bottles or an electric pad. Bevan, in 1920, went on record as saying that under no circumstances should general anesthesia be used in operating these infants. However, all the infants in this series were operated under ether anesthesia given by the open mask drip-method. I think this procedure is absolutely safe and the most satisfactory method when given by a competent anesthetist skilled in giving anesthesia to infants. There were no anesthetic deaths in this series.

Rammstedt's operation was performed on all these babies, and I do not believe that this operation can be improved upon for simplicity, speed and results. Rammstedt is responsible for the major reduction in the mortality rate of this disease. Perhaps the only danger in this muscle-splitting operation lies at the duodenal end of the tumor. Bear in mind that the transition from hypertrophied to normal muscle is very abrupt at the duodenum and special caution must be exercised to avoid tearing into the pyloric canal. If such an opening does occur, it must be recognized and repaired at once. Such an accident occurred four times in this series, with no untoward results.

Hemorrhage can usually be controlled with hot packs, but fine ligature must be placed around distinct bleeding points. Fine silk ligatures have a tendency to cut through the muscle too easily and I have found catgut more satisfactory. Closure of the abdominal wall should be carefully done in layers, and stay-sutures should always be used to prevent postoperative eviseration. Protect your dressing well with rubberized silk or some similar substance to prevent contamination of the wound.

Credit for much of the success we have now in the treatment of this condition must be given to the pediatricians because of their splendid postoperative technique. I question if surgeons alone could have improved much on Bolling's figures in 1925 when he reported a mortality rate of 8.5 per cent. To my mind it is the close coöperation between pediatricians and surgeons which saves so many lives. The major responsibility of postoperative care, the feeding problem, lies in the hands of the pediatrician.

On returning these babies to bed, external heat, in the form of hot water bottles must be used. Chloralhydrate may be necessary to prevent crying during the first 48 hours. Most of the infants in this series received $\frac{1}{2}$ ounce of water by mouth about two hours after re-

turning to bed. Two hours later they received $\frac{1}{2}$ ounce of breast milk. This schedule is repeated every two hours for the first 24 hours. In the second 24-hour period, increase water and milk to 1-ounce feedings and continue this increase daily until the demand of the infant is met. When 4 ounces of milk is being given at a feeding, we usually drop out the water, and feed every four hours. With such a feeding schedule, we find that no vomiting takes place after the operation, convalescence is smooth, and hospital stay averages about 14 days.

There were three deaths in the series, giving a mortality of 3 per cent. All deaths occurred during September of 1933. In each instance, the infant developed an intractable diarrhea, and died. Postmortems were done on two of the babies. The one who died 10 days after the operation, showed a well-healed abdominal wound, peritoneal cavity normal in appearance. The stomach was moderately dilated, pylorus still presented hypertrophy and a well-healed scar, lumen readily admitted a lead pencil. Microscopic section through the healed scar of the pylorus showed intact mucus membrane. Over this membrane there was a thin layer of muscle; above this there was a fibrin clot which was beginning to organize; in the edges of the clot there were numerous giant cells surrounding small pieces of catgut; there were very few of any p.m.n. cells in the neighborhood of the wound. The peritoneum seemed to be creeping over the defect.

The one who died three weeks after operation showed the scar of original operation well healed. The scar on the pylorus was well healed with no evidence of infection or inflammation. The stomach was still distended, the wall being $\frac{1}{2}$ to $\frac{3}{4}$ cm. in thickness. Pylorus was patent; there was no evidence of obstruction or retention.

No cause of death other than alimentary intoxication could be found in either of these cases, and I suppose that in all humility one might place the operative mortality at 1 per cent.

This series covers a period of 12 years. Some of these children are now 10 and 12 years of age, and they are all perfectly well, normally developed children; none of them have any symptoms referable to pyloric obstruction.

I sometimes wonder if we of the present generation appreciate the struggle and efforts put forth by the older men in their conquest of this disease. Are we not prone to forget about the early mortality figures and the tragedies which accompanied this condition only at the turn of the century? I know of no other operation in the entire field of surgery which has reduced its mortality from 100 per cent to less than 3 per cent in a period of 40 years.

NOTE—Seven additional patients have been operated since this paper was written, and there has been no further mortality.

Reducing Premature Infant Mortality with Special Emphasis on Resuscitation*

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DURING the past few years much interest has been shown in the infant mortality rates of the various states of the country. The rates have been falling but the number of infants dying from prematurity has changed very little; in fact, in some sections of the nation there has been an actual increase in premature baby deaths. It is therefore of special significance to make every effort to reduce the premature infant mortality rates. A better understanding of the newer methods involving management and feeding of these small infants is most essential.

At the Minneapolis General Hospital, an opportunity presented itself which permitted the gradual application of the various methods developed for the care of the premature infant. At one time the mortality rate was very high as revealed in Table I. The deaths were divided into two groups, those occurring during the first forty-eight hours of life, and those appearing after the second day of life. The first few days were referred to as the "period of resuscitation." The second period was roughly divided into two phases. The interval from the forty-eighth hour to the tenth day represented the period of "adaptation to feeding." From the eleventh day up to the time of discharge was considered the "period of growth and development."

An analysis of the causes of death in each period gave some indication as to the procedures which might give satisfactory results. The study has extended over a period of eight years. During the first and second years of observation, a large number of the babies expired from bronchopneumonia, otitis media, and erysipelas in the period of growth and development. Respiratory infections were prevalent among the personnel of the hospital especially during the winter months of the second year. Rigid isolation technique was therefore introduced and the results were most encouraging.¹ The 27 per cent death rate occurring after the tenth day of life in the second year of observation dropped to 3.5 per cent the following year. This marked reduction was considered to be due in part to the fact that less infection existed in the community during the third year. However, there was again an increase of respiratory infections in the fourth year but the death rate rose only to 6.9 per cent. With gradual improvement along simple lines in the physical set-up of the premature nursery, permitting isolation technique to be carried out with greater ease, there was a consistent fall the following years in the number of infants who were lost during the period of growth and development. This is shown in Table II.

Examination of the records of the infants dying during the period of adaptation revealed that many of these

babies had a large amount of regurgitation which was followed in a few days by marked diarrhea. At autopsy, bronchopneumonia was found in a few cases while others revealed some evidence of infection in the middle ear. After a study of the feeding program, the volume of the food given these infants was considered to be too large. An attempt had been made to cut short the period of physiological weight loss and obtain a rather rapid weight gain early in the life of the infants. The result was regurgitation followed by diarrhea which so weakened the premature's condition that death easily occurred in some cases from an infection. Efforts were made to stop the regurgitation and the diarrhea by concentrating the formulae and by changing to feedings containing a high protein and a low carbohydrate content. The response was poor. The best policy appeared to be prevention of the diarrhea rather than treatment.

A new feeding schedule was adopted.² Definite amounts of food were prescribed for the infants. Starting with very small amounts for the smaller premature babies, the food intake was gradually and carefully increased for at least ten days. After this, larger increases in volume were permitted. No effort was made to produce a rapid gain in weight. In some instances the infants still weighed less on the tenth day than at birth. However, the majority of the babies adapted themselves to the formula and progress was ultimately good.³ The mortality rate during the period of adaptation to feeding dropped to a low figure and remained there, a fact clearly demonstrated in Tables I and II.

Strict attention to the protection of the premature from respiratory and skin infections and proper regulation of the feeding schedule reduced the premature infant mortality rate after the second day of life, but there was no improvement during the first forty-eight hours. In fact during the third and fourth years of observation (Table I) there was an increase in the mortality rate. Many babies died shortly after birth. Too much attention had been given to the later phases of premature care, and not enough emphasis had been placed on the methods of resuscitation.

It was noted that many of the premature infants who failed to respond during the first hour of the period of resuscitation had subnormal temperatures; a few were as low as 93 F. The ordinary measures of applying external heat especially by means of a hot water bottle had been used. This observation prompted the construction of a unit or incubator containing a regular bassinet, by means of which the temperature of the infant was kept at the proper level from the moment of birth (figure 1). The unit was simple and inexpensive. It consisted of a white enameled wooden box, supported on four legs with roller casters. The cover, which could

*From the department of pediatrics of the University of Minnesota. This is the third of a series of papers on "Premature Care" appearing in the *Journal-Lancet*.

TABLE I.
Mortality Rate of Premature Infants
Four Year Period -- Isolation Technique and Definite Feeding Program Established

Year of Observation	1 1930-1931*		2 1931-1932*		3 1932-1933*		4 1933-1934*	
	No.	%	No.	%	No.	%	No.	%
Total No. of Prematures	148		155		139		145	
No. of Deaths	No.	%	No.	%	No.	%	No.	%
Less than 1 hr.	7	4.7	5	3.1	12	8.6	17	11.7
1 hr. to 16 hr.	18	12.1	22	14.0	19	14.0	15	10.5
16 hr. to 48 hr.	9	6.0	6	3.7	6	4.4	4	2.8
Total up to 48 hr.	34	22.8	33	20.8	37	27.0	36	25.0
48 hr. to 10 days	34	23.0	27	18.0	5	3.5	1	0.7
More than 10 days	22	15.0	42	27.0	5	3.5	10	6.9
Total over 48 hr.	56	38.0	69	45.0	10	7.0	11	7.6
Grand Total	90	60.8	102	65.8	47	34.0	47	32.6

*July 1 to July 1.

TABLE II.
Mortality Rate of Premature Infants
Four Year Period -- Special Emphasis Placed on Resuscitation

Year of Observation	5 1934-1935*		6 1935-1936*		7 1936-1937*		8 1937-1938*	
	No.	%	No.	%	No.	%	No.	%
Total No. of Prematures	146		120		89		96	
No. of Deaths	No.	%	No.	%	No.	%	No.	%
Less than 1 hr.	5	3.4	3	2.5	2	2.2	3	3.1
1 hr. to 16 hr.	17	11.6	14	11.7	3	3.3	5	5.2
16 hr. to 48 hr.	6	4.1	7	5.8	6	6.7	6	6.2
Total up to 48 hr.	28	19.1	24	20.0	11	12.2	14	14.5
48 hr. to 10 days	5	3.4	4	3.3	0	—	2	2.0
More than 10 days	7	4.9	4	3.3	1	1.1	2	2.0
Total over 48 hr.	12	8.3	8	6.6	1	1.1	4	4.0
Grand Total	40	27.4	32	26.6	12	13.3	18	18.5

*July 1 to July 1.

be raised, contained sliding panels permitting observation of the baby through a small opening without too much exposure. Inside the incubator a spark-proof thermostat regulated the temperature, the heat being supplied by four electric lights on the floor of the box. The unit was always kept ready in the obstetrical delivery room with the thermostat set at 100 F. This temperature kept warm the equipment in the incubator such as the bedding of the bassinet and the receiving blanket containing the sterile absorbent cotton enclosed with gauze.

Immediately after birth, the premature baby was placed in the bassinet and wrapped in the warm cotton and blanket. The infant was then closely watched and the necessary measures for resuscitation were performed within the unit rather than on the delivery table where chilling could easily take place. Great care was taken to remove mucus from the air passages by carefully wiping the nose and mouth with a piece of soft gauze. The head of the bassinet was always lowered four to six inches so that the secretions and the mucus which had accumulated in the respiratory passages could escape (figure 2). For the first hour of life, the premature infant was disturbed as little as possible. Then if he appeared to be doing fairly well, he was moved in the incubator to the nursery and weighed. Following this, a rest period of sixteen hours was permitted. No water or

food was administered. At the end of this period, excessive amounts but not all of the vernix caseosa was removed with oil⁴ and if the baby's color was good, water and later milk were given in small amounts. Throughout the first forty-eight hours of life the infant was closely observed for cyanotic attacks, for they could appear suddenly and without warning. This was especially true in case of infants weighing less than 1500 grams (3.3 pounds).

The results of these simple measures in handling the premature babies were fairly good. The mortality rate dropped from 19.1 and 20 per cent in the fifth and sixth years of observation to 12.2 and 14.5 per cent in the seventh and eighth years (Table II). However, with the constant change in the attending and resident physicians, there were short periods during which a tendency to drift back to the older methods of resuscitation occurred. Some of the physicians did not appear to take enough interest in the resuscitation of the newborn or the treatment of asphyxia.

It is altogether fitting, therefore, to offer in more or less outline form some of the salient features of present day resuscitation in order to stimulate a more determined and concentrated effort to improve the system of accomplishment of normal breathing in the newborn. Although there is still plenty of room for investigative studies,



Fig. 1. Exterior view of premature unit or incubator. The sliding panels for the opening in the cover are shown.



Fig. 2. Interior view of the incubator. The rod and ratchet combination shown on the right permits lowering or raising of the head end of the bassinet.

present methods when properly performed can save many infants, especially premature babies. There always will be a certain number of infants who will die from intracranial hemorrhages, anomalies incompatible with life, or marked developmental deficiencies.

I. Theories of Respiration

Marchetti⁵ refers to three hypothetical factors that may initiate the expansion of the lungs and thereby establish respiration in the newborn: the physical, chemical and biological. Under the first, the theory has been presented that the infant begins to breathe at birth as a consequence of reflex stimulation set up by the trauma resulting from labor. Marchetti points out, however, that when one considers how adverse and difficult labor may be and the injury that the newborn may sustain as a result, such a theory is obviously untenable. Other investigators propose that inasmuch as carbon dioxide stimulates the respiratory center, it is the increase in carbon dioxide tension in the blood of the newborn at the time of birth that initiates respiration. Eastman⁶ has shown from his studies on the fetal blood that the baby will begin to breathe whether the carbon dioxide tension is either high or low. From the evidence that is available up to the present time, it appears that chemical factors do not entirely explain the onset of respiration.

The existence of rhythmic respiratory movements that simulate those of extra-uterine life has been demonstrated. This phenomenon may be considered the biological factor, for it is difficult to understand how such

a vital function as respiration should suddenly become initiated as soon as the infant is born. Marchetti states that he is led to believe from all the evidence at hand that the mechanism of respiration biologically is established in intra-uterine life and assumes its vital function at birth. This function is awakened by a combination of the chemical factors considered in the previous paragraph. The biological theory leads one to consider the following statement of Eastman: "Instead of being an attempt to start something new, the treatment of apnea at birth now becomes an effort to preserve and safeguard a sensitive mechanism-already in active existence."

II. Analgesia, Anesthesia and the Newborn Infant

Pressure from the laity has forced physicians to increase the use of analgesia and anesthesia. In many hospitals few labors are carried through with no drugs whatever. Wilson and his associates⁷ admit that although the incorrect or excessive use of drugs may cause anxiety, as a rule such infants respond after a more or less prolonged period of apnea with cyanosis. Occasionally, however, a depression is encountered which is so deep that after a few shallow respirations the apnea recurs, and such babies can be kept alive only with the greatest difficulty. The important point is, that although few lives are lost as a result of the use of drugs per se, such infants cannot stand much additional asphyxia. This applies especially to premature babies. If in such cases a long deep anesthesia is employed, many of these in-

TABLE III.
The Influence of Obstetrical Analgesia and Anesthesia on the Newborn Child
Observations of Various Investigators

Author and Year	Opium Derivatives	Various Barbiturates	Scopolamine, rectal ether; paraldehyde	Inhalation of ether	Nitrous oxide and oxygen
Eastman ⁶ 1936	—	—	—	Produces slight depression of O ₂ saturation of fetal blood with no injury to fetus through anoxemia.	In ratio of 85:15 or weaker for less than 5 min. causes moderate degrees of fetal anoxemia with infant usually not harmed.
Clifford ⁸ 1937	Unfavorable influence on newborn is in direct proportion to amount given and time interval before delivery.	No relationship exists between size of dose or time and condition of infant at birth.	No effect is shown on infant attributable to the ordinary doses used of these drugs.	Less than 1 ounce of ether inhalation has no effect on the infant.	No relationship noted between gas-oxygen administration and infant's condition. No information given as to effect of various concentrations of anesthetic.
Wilson ⁷ 1937	Exert powerful depressing effect and should not be used less than 2 hrs. before delivery.	Depression of infant is not easy but if it occurs response to resuscitation is poor.	Paraldehyde is most harmless of available drugs.	Safe unless present in blood in high concentration for long period of time.	Little danger to infant if 15% or more of O ₂ is used. If O ₂ ratio below this, asphyxiation of mother and baby will occur, and resuscitation may be difficult.
Teel ⁹ 1938	Given within 4 hours before delivery, followed by marked and sometimes alarming asphyxia.	—	—	Prolonged maternal anesthesia prior to delivery with much less than 20% oxygen in the inhaled mixture results in varying degrees of and sometimes marked asphyxia in the newborn infant.	
Cole 1939 (Personal communication)	Within 4 hours of delivery morphine causes severe asphyxia (28% of newborns) while before 4 hours, much less asphyxia (17.7% of infants)	Small amounts not effective but large amounts (nembutal, 4 units*) cause severe asphyxia (14.7% of newborns).	Small amounts not effective but fairly large amounts (scopolamine, 4 units**) may cause severe asphyxia. (12.8% of infants).	Ether anesthesia tends to reduce birth shock, although spinal anesthesia is better than ether in caesarean section.	—

*Nembutal, one unit -- 1½ grains

**Scopolamine, one unit -- 1/150 grain

fants will die. They might recover from the narcosis or the asphyxia alone, but are overwhelmed when one is superimposed upon the other. If a traumatic delivery with deep anesthesia is anticipated, or other causes of asphyxia are present, or likely to occur, it would be safer to dispense with drugs. Table III summarizes the conclusions of various investigators concerning the influence of obstetrical analgesia and anesthesia on the newborn child.^{8,9}

The evidence presented in favor of little or no drug therapy is further supported by the recent observations of Schreiber.¹⁰ He concludes from his studies that the depressing effect on the respiratory center of birth analgesics given in greater than pharmacologic doses bears a direct relationship to the degree of apnea. The extent of the apnea has a direct relationship to the severity of the cerebral symptoms after birth. The severity of the cerebral symptoms is in direct relation to the amount of damage to the brain tissue. From these relationships, it appears that analgesics given in greater amounts than the pharmacologic dosage may in many instances be the causative factor of fetal anoxemia, with resultant cerebral damage in the newborn infant.

III. Clear and Open Air Passages from Lips to Lungs

Repeated attention to the air passages immediately after birth will reduce the incidence of cyanosis due to mucus and amniotic sac contents in the upper air passages, and cessation of cyanosis following such measures confirms the diagnosis of obstruction of the upper respiratory passages. Attempts to make the infant breathe should be refrained from until the passages are well cleared. This will prevent much aspiration of the sub-

stances which have been demonstrated at autopsy in the lungs of many infants.

IV. Mouth to Mouth Insufflation

This method of resuscitation is an old one. It carries serious risk of infection and depends largely for success on the experience and skill of the physician. His mouth serves as a mask and air is forced into the infant. It usually enters the stomach but if sharp, short, repeated puffs are made, a little may enter the trachea, especially if the head is held in hyperextension. Wilson believes that in the hands of the novice the method is always dangerous, and even after long experience, the possibility of ruptured air sacs is great. Over 14 cm. of water pressure will rupture the alveoli. Occasionally a baby is saved by its use.

V. Direct Exposure Intubation and Intratracheal Insufflation of Gases

When mild measures have been unsuccessful in the more serious forms of asphyxia neonatorum, the newborn infant may respond to insufflation.¹¹ With the infant type of direct vision laryngoscope, the tongue is easily depressed and the larynx exposed. The pharynx is quickly cleansed of any mucus with the little sucker and the laryngeal tube is introduced within the vocal cords and well into the larynx. Again, the sucker is used to aspirate any contained matter, mucus or other fluid. When it is ascertained that all obstructive material has been removed, the laryngeal tube is connected with the gas tube and insufflation of oxygen with or without carbon dioxide is begun.

The method has not been very popular in the resuscitation of premature infants. Flagg,¹² however, makes the

following statement to any objections which may arise: "If the infant to be resuscitated is premature, it is practical to use the tube employed for suction as an insufflation instrument. This tube is considerably smaller in diameter than is the ordinary endotracheal insufflation tube. With this technique, the suction tube is introduced into the small glottis, and suction is gently performed. The tube is then withdrawn and is attached to the insufflation tube, the mucus is blown out, and the tube is replaced as an insufflation tube."

VI. *Stimulation*

A. *Irritation of the Afferent Nerves:* Respirations should be stimulated gently for violent methods may traumatize the infant or aggravate existing birth injuries. To encourage deep breathing or crying, the skin may be rubbed, the soles of the feet thumped, or a small amount of ether dropped on the skin. This may be repeated from time to time as needed, but overstimulation should be avoided because it is fatiguing. This is particularly true of premature infants and weaklings. There is one mode of resuscitation which should never be used. It involves strong, even painful, afferent stimulation. The apneic infant is plunged into cold water or it is slapped hard and kneaded. No squeezing, pulling, or stretching of the body or limbs can induce the slightest inflation of its lungs, although the method of swinging the apneic and atelectatic baby, or the safer method of moving the body feetward and then sharply headward, may jerk the lungs partially open. If any other form of handling induces breathing, that result is induced reflexly, not mechanically.

B. *Chemical:* Mention must be made of medicinal treatment of asphyxia neonatorum. Lobeline has been used with rather indifferent results. It is undoubtedly a definite respiratory stimulant, but it is also a cardiac depressant. Nevertheless, Litchfield and Beilly¹³ believe that asphyxia neonatorum of the central type may be overcome frequently by injection of alpha-lobeline hydrochloride into the umbilical vein. The drug will lower the threshold of the respiratory center to carbon dioxide stimulation and may be, if used in this way, a valuable adjunct in the resuscitation of the newborn.

Carbon dioxide is considered to be the most powerful stimulant for the respiratory center.¹⁴ The inhalation of a mixture of carbon dioxide and oxygen is sufficient for almost all cases of moderate asphyxia. A close-fitting mask is held tight over the face and a small rubber bag, attached to the mask and filled with a mixture of 5 to 10 per cent carbon dioxide in oxygen is squeezed 10 or 15 times a minute. Usually a small, but sufficient, part of the lungs is thus inflated; and under the influence of the inhaled gases the baby begins to breathe. The administration of the gas is then continued by allowing the baby to rebreathe into the bag; and respiration soon becomes well established.

A few objections have been offered to the use of carbon dioxide with oxygen for the newborn. Some babies do not respond to the stimulus of 5 per cent carbon dioxide. The answer is that this is generally true only of those born in deep narcosis, and that in proportion as

the sensitivity of the respiratory center is depressed by drugs or by asphyxia, higher percentages of carbon dioxide are needed to induce stimulation of breathing and muscle tonus. Another objection is that raised by Eastman on the basis of his extremely careful and valuable studies upon asphyxia neonatorum. In cases of asphyxia pallida, he finds in the blood, low oxygen, low pH, low alkali, high lactic acid and a more than normal pressure of carbon dioxide. He accepts the view that such conditions constitute an "acidosis" in the sense of an acid intoxication; and he infers that administration of carbon dioxide should exacerbate the intoxication. Eastman summarizes his investigations by stating that asphyxia neonatorum, in all of its manifestations, is an example of profound oxygen want. For this reason the one urgent necessity in its treatment is oxygen, and by the same token, the one urgent requirement in its prevention is oxygen. The weight of clinical experience, however, seems overwhelmingly against Eastman. Observers are unanimous in the belief that carbon dioxide is of extreme value in the treatment of asphyxia of the newborn.¹⁵ In spite of excessive accumulation of carbon dioxide in the blood, additional carbon dioxide will cause stimulation of a depressed respiratory center. Oxygen renders the anoxic respiratory center more sensitive to stimulation.

VII. *Mechanical Resuscitation of the Newborn*

Murphy¹⁶ has adapted the Drinker respirator to the treatment of the asphyxia of the newborn. The apparatus as employed today has little if any place in the initiation of respiration in the newborn. In some instances it has been of great value for the reviving of the newborn infant which has once had normal respiratory action. However, its value is limited in the respiratory disturbances of the premature where the respirator cannot synchronize its motion to those of the premature infant.

Martinez¹⁷ has employed the E. & J. Resuscitator. It is a positive and negative apparatus, and the pressure is exerted by the oxygen over the baby's face through a mask similar to that used in administering gas anesthesia. The apparatus is equipped with two tanks—one of oxygen and the other of a mixture of 90 per cent oxygen and 10 per cent carbon dioxide, so that either can be used with ease. The resuscitator is almost fool-proof, as the positive and negative pressure ceases automatically when the child breathes of his own accord and it allows him to breathe the oxygen from the bag. If desired, the child may breathe the oxygen-carbon dioxide mixture through the inhalator attachment. Although Martinez has used the apparatus in more than 500 cases, observations by other investigators must be recorded before any definite evaluation of this resuscitator can be made.

SUMMARY

The number of premature infants who die each year has not greatly decreased. This has been one of the factors which have prevented a further drop in the infant mortality rates.

Although the cause of death in some of the premature infants has been intracranial hemorrhage, congenital anomalies, or deficiencies, many premature babies have died from infection, poor feeding, and failure to respond to the older methods of resuscitation.

An opportunity has presented itself which has permitted the establishment of isolation technique and the application of a definite feeding program in the care of the premature infant. The change in the management of these babies has resulted in a rather marked fall in the mortality rate after the second day of life. A temporary increase in the number of deaths during the first few days of life was checked by making arrangements to keep the temperature of the premature infant within the normal range from the moment of birth. In addition, simple up-to-date measures of resuscitation were employed with gentleness being the fundamental requirement.

In spite of a fairly satisfactory response, there exists plenty of room for improvement in the resuscitation of the newborn, especially the premature infant. The better

the co-operation between the obstetrician and the pediatrician, the more benefit the general practitioner will receive from the results of their investigations.

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Book Reviews

Guiding Human Misfits, A Practical Application of Individual Psychology, by ALEXANDRA ADLER, M.D., research fellow in neurology, Harvard University; New York City, The Macmillan Company, 1938. Price, \$1.75.

The author of *Guiding Human Misfits* is the daughter of the founder of individual psychology, ALFRED ADLER. She herself has specialized in neurology, neuropsychology and psychotherapy both in America and in Europe, but still adheres most ardently to the fundamental psychology laid down by her father. Dr. ALEXANDRA ADLER emphasizes at the beginning of her book and throughout the entire small volume that the pattern of later life is set by the early formative years of childhood. She gives special attention to the treatment of neurosis in childhood, and considers it is better to be "a light house than to be a life boat," a message to all educators and parents. Statistical data and normal types are purposefully omitted by Dr. ADLER who emphasizes her statements by citing case histories. An interesting chapter is the psychology of criminals, a subject which is often omitted in the majority of textbooks on psychology. This small volume should be helpful to physicians and social workers, as well as to educated parents and other lay people.

Human Pathology, by HOWARD T. KARSNER, M.D., professor of pathology, Western Reserve University, Cleveland, Ohio; fifth edition, revised, cloth, 974 pages, 443 illustrations and 18 color plates; Philadelphia: J. B. Lippincott Company, 1938.

This volume is divided into two parts, the first devoted to general pathology, and the second dealing with systematic pathology. Topics in both parts are treated with a detail and specificity that leaves no room for doubt. Previous editions have been adequately brought up to date, as attested by the lengthy and recent bibliographic lists at the end of each chapter. Throughout the text references are made to authors and studies concerned with the special topics under discussion.

Both as a textbook and as a concise reference for the practicing physician, the book deserves a place in every medical library.

A Biological Approach to the Problem of Abnormal Behavior, by MILTON HARRINGTON, M.D., Psychiatrist, Institution for Male Defective Delinquents, Napanoch, N. Y.; 459 pages; Lancaster: The Science Press Printing Company, 1938.

This book presents a new approach to the problems of abnormal behavior, the mechanistic rather than the animistic theory of the function of the human mind. It is considered in two major parts, one dealing with psycho-physiology and the other with psycho-pathology. The physiological approach is based on the stimulus response and elaborated reflex action with stress on the sensory mechanism aroused by the stimuli and the form of the response. No attempt is made to embody the work of PAVLOV although the current concepts of animal psychologists are included. The approach to the psycho-pathology is entirely mechanistic but no attempt is made to offer any validity for the theories formulated. Indeed, as the author himself indicates, these very approaches have not fulfilled most of the criteria essential for the diagnosis and treatment of mental diseases. The author stresses five different methods of making an adjustment. The thesis laid down is that behavior disturbances constitute one of these types of adjustment. The discussions are stimulating but not altogether adequate to cover the field of abnormal human behavior.

Synopsis of Clinical Laboratory Methods, by W. E. BRAY, M.D., professor of clinical pathology, University of Virginia, director of clinical laboratories, University of Virginia Hospital; second edition; St. Louis: C. V. Mosby Company, 1938. Price, \$4.50.

Because of the need of keeping abreast with new clinical laboratory methods, Dr. BRAY offers a second edition of his already popular work. In this new volume, modern methods have been introduced and old procedures have either been discarded or standardized. In addition, Dr. BRAY has given clinical interpretation to some of the laboratory findings. Details have been subordinated to generalities hoping that the beginning student will have had supervised instruction in details. Dr. BRAY has included several additional procedures in this second edition, the most important of which are serum phosphatase determination, titration of staphylococcus antitoxin in the blood serum, cough plate method for diagnosis of whooping cough, vitamin C titration from the urine, and the optimum dose titration of antigens for the Wassermann test. The second edition of this very practical book should receive a hearty welcome.

(Continued on p. 244)



The JOURNAL LANCET

Represents the *Medical Profession of*
MINNESOTA, NORTH DAKOTA SOUTH DAKOTA and MONTANA

The Official Journal of the

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American Student Health Association

North Dakota State Medical Association
South Dakota State Medical Association
Medical Association of Montana

The Sioux Valley Medical Association
Great Northern Railway Surgeons' Ass'n

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MINNEAPOLIS, MINN., MAY, 1939

THE MEDICAL ASPECTS OF DENTAL HEALTH IN CHILDHOOD

Though much has been written and said about the medical aspects of dental health in childhood, it is fair to say that such an important subject can hardly be overemphasized. Maldevelopments and defects have their onset and perhaps their greatest effects on health in the formative years and the responsibility for proper prophylaxis and care should fall to the lot of physicians and dentists jointly.

It is beyond the scope of this discussion to more than mention such extremely formidable factors as healthy genetical anchorage and proper antepartum prophylaxis in dental health. The former is all too frequently deficient as is evidenced by common anomalies of development and dento-facial deformities. Since all the deciduous teeth are partially calcified at birth and even the first permanent molars calcify soon thereafter, it is obvious that prenatal influences likewise have an important bearing on proper odontoblastic, ameloblastic and other functions that are vital to sound teeth.

From earliest infancy, defects which are manifest or those which progress insidiously deserve the most careful coöperation of dentist and physician. Deformities, developmental defects, congenital disease and deficiency states are no doubt our first consideration. It has been repeatedly demonstrated that dental hypoplasia and caries can be influenced by diet and that children with "optimum" nutrition have less of such defects than those

with ordinary or poor nutrition. The so-called "coeliac" type of diet with extremely high protein, monosaccharide and vitamin values (meat, egg, dairy products, banana, simple fruits, vegetables and cod liver oil) has been shown to effect "optimum" nutrition better than one rich in starches, fats and complex carbohydrates. Balance studies have further demonstrated that such a diet is quite adequate in calcium, phosphorus and iron and that excessive ingestion of these elements in some forms may result in reciprocal losses of other minerals from the body which may become detrimental.

In spite of our increased knowledge regarding nutrition, we find, as in other applications of fact, that practise is axiomatically slow. Adherence to a diet of essentials over the long period necessary for good results is difficult and the desires and whims of a child usually come to take precedence all too often. We must, therefore, remind our patients that calcification of the teeth is now regarded as a more or less continuous process. Biochemical changes from deficiency states, deformities and disease may not be evident in the tooth until very late.

The physician must be especially concerned with the known effects of inadequately treated prenatal disease, with refractory anemia and rickets attendant to prematurity and even with rickets occurring in apparently healthy babies receiving cod liver oil. Other vitamin deficiencies though quite uncommon may have an indirect effect on dental health. In the appraisal of a child's

health, one familiar with normal attributes can and should recognize thyroid, pituitary and other hormonal deficiencies early enough to preclude by treatment such sequences as late dentition, poor calcification and early caries. That these and especially the nutritional inadequacies mentioned have much to do with the etiology of dental caries can no longer be denied. A lack of proper balance of all these factors deprives the enamel of its ability to oppose the disintegrating effects of acids and bacteria in the mouth. The source of these harmful acids has been the subject of a great deal of speculation. If they result, as some contend, from the effect of bacteria on certain complex carbohydrates or on "fractions" of certain cereal grains fermenting in the oral cavity, it would seem prudent to employ a dietary regimen in which these possible offending factors have been eliminated before consumption. If caries has already begun in a child lacking in "optimum" nutrition, complete co-operation on the part of dentist and physician is especially important.

Correction of nutritional and endocrine faults and of diseased states affecting the child's teeth may task the ingenuity of one well equipped to understand child health. Painstaking operative dentistry on deciduous teeth and careful orthodontia have become recognized as fundamentals in a sound foundation for general health. The pathologic results of dental caries on the human organism are, of course, immediate and remote and the loss of effective masticating surfaces not only interferes with proper trituration of food but leads eventually to pulp decay and loss of the tooth. Infected teeth and alveoli serve as potent sources of disease and may be the cause of profoundly debilitating states. Despite the fact that the permanent teeth depend on the deciduous teeth for jaw growth and prevention of caries, when one is confronted with the question of removal of deciduous teeth before their natural time for exfoliation, it must be remembered that early removal is much to be preferred over possible disability from systemic invasion of bacteria.

If we will regard sound teeth as but one index of well ordered skeletal growth and treat them with the same care as we would any other skeletal part, we will have done much to advance child health in general.

E. S. P.

NO SUBSTITUTE FOR NURSING

Dr. Oliver Wendell Holmes in a lecture to his students, November 6, 1867, said, "A pair of substantial mammary glands has the advantage over the two hemispheres of the most learned professor's brain in the art of compounding a nutritious fluid for infants."

In spite of all our pediatric progress, no perfect substitute has yet been found for mother's milk. There is some element that enters into its composition, the exact nature of which may never be known. The personal convenience of the socially ambitious mother is frequently an obstacle to an ideal diet schedule. When the mother does not have a sufficient quantity of this "nutritious fluid," we must always encourage supplementary and discourage substitutional feeding so far as possible.

A. E. H.

STUTTERING

In a splendid orienting discussion of stuttering, Cobb and Cole¹ point out that speech, one of the most complex and phylogenetically new functions, is integrated at several levels. The lowest level includes the peripheral muscles of speech and their nerve supply from the medulla oblongata and defects in this mechanism produce different degrees of aphonia. Cortico-bulbar neurones comprise the next level and lesions of these films cause dysarthria. Lesions in the cerebellum, a coordinating mechanism of great importance, result in symptoms such as explosive, monotonous and "scanning" speech. The integration of speech is most complex at the cerebral level, and lesions in this part of the brain result in aphasia and agnosia.

The neurological pathology of stuttering is not known, but the observation that this type of speech defect runs in families is suggestive of cerebral defects of hereditary origin. Stuttering is often associated with a lack of clearly defined dominance of one cerebral hemisphere and also with ambidexterity and motor awkwardness. Since speech is closely related to the emotional life, stuttering has important psychoneurotic aspects. Emotional stress precipitates stuttering and amelioration of this stress relieves this symptom.

Variations and amalgamations of three principle types of therapy are used in the treatment of stuttering. The mechanistic method lays particular stress on exercises and this speech drill serves to correct bad phonetic habits. Psychological therapy is of especial value in removing the handicap of emotional tension. The neurological method of treatment involves the use of special exercises which favor the development of a clearly defined dominance of one cerebral hemisphere. Its use is limited preferably to patients in whom cerebral dominance is defective. In general the treatment of stuttering should be appropriately individualized, and liberal use should be made of various combinations of different therapeutic measures known to be of value.

C. A. S.

1. Stuttering: Cobb, Stanley, and Cole, Edwin M., *Physiol. Rev.* 19:49, (Jan.) 1939.

THE AMERICAN CONGRESS ON OBSTETRICS AND GYNECOLOGY

The American Congress on Obstetrics and Gynecology, which is to be held September 11 to 15 in Cleveland, Ohio, is one of the most significant of the forthcoming medical events. This Congress was proposed by the Central Association of Obstetricians and Gynecologists. Many national, sectional, and local societies of obstetrics and gynecology passed resolutions approving of the congress, and representatives of these societies petitioned the American Committee on Maternal Welfare, Inc., to sponsor the meeting.

The purpose of the meeting is to present a program of our present-day medical, nursing, and health problems from a scientific, practical, educational, and economic viewpoint so far as they relate to human reproduction and maternal and neonatal care. It is hoped that this will lead to better understanding among professional

groups of the problems involved in human reproduction and to a better understanding and coordination of effort among the groups who are participating in the Congress. A five-day program is being planned with group meetings in the mornings and joint afternoon and evening sessions. Scientific and educational, as well as technical or commercial exhibits will add to the value of the meeting.

It is to be hoped that many will avail themselves of the opportunity presented by this worthwhile program.

C. E. S.

BOOK REVIEWS—(Continued)

The Interns Handbook, by members of the faculty of the College of Medicine, Syracuse University, under the direction of M. S. DOOLEY, M.D.; 2nd edition, revised and reset, 523 pages plus index; Philadelphia: J. B. Lippincott Co.: 1938.

The Interns Handbook, edited by the Syracuse University medical faculty, under the chairmanship of M. S. DOOLEY, M.D., is exactly what the title implies: a concise, comprehensive correlation of exact medical information that can be quickly located and utilized under emergency conditions. The information given is generally in full enough detail to solve indecisions in emergencies which the intern is constantly meeting.

The Interns Handbook is neither a compend nor a textbook. Neatly printed and conveniently bound in a pocket-size edition, this volume will help the young doctor entering his internship to correlate the hard-won knowledge represented by his medical diploma, with physician's skill needed at the bedside or in the presence of a hitherto-unseen patient in a coma.

There is an especially good section on drug monographs, condensed from the *U. S. Pharmacopoeia* and the *A. M. A.'s New and Non-Official Remedies*. Entirely new sections have been added on allergy, anesthesia, chest conditions, circulatory disturbances, coma, dehydration, food poisoning, fractures, head injuries, intern relations, local anesthesia, medical jurisprudence, medicine and social service, newer drugs, pregnancy test, resuscitation, selected nursing procedures, sex hormones, shock, solutions and vitamins.

Textbook of Bacteriology, by THURMAN B. RICE, A.M., M.D., professor of bacteriology and public health, Indiana University School of Medicine; 2nd edition, revised, 563 pages with 121 illustrations; Philadelphia and London: W. B. Saunders Co.: 1938. Price, \$5.00.

When many teachers expressed a desire for a shorter textbook of bacteriology, a book which would permit students to master at least the text in one semester, Dr. THURMAN B. RICE, professor of bacteriology and public health at the Indiana University School of Medicine, prepared such a volume. It proved valuable not only to students but also to physicians who wished to review the subject of bacteriology and found most books too long and too technical.

With this thought in mind, the author has described in detail only those technical processes which may be done by the practicing physician, limited in time, material and equipment. When more elaborate technic is needed, instructions are given for taking a sample to be sent to the laboratory. Thanks to the clear, well-written presentation of the subject made by Dr. RICE, a second edition of his book is now required.

The new edition is changed only to bring the text up-to-date, to fill in certain omissions, and to correct inaccuracies. Among the new subjects included in the second edition are the typing of the pneumococcus in the light of recent research, sulfanilamide therapy, and the use of tetanus alum-toxoid. Controversial material has been deliberately omitted on the theory that a textbook should contain only those phases of a subject which are rather definitely established.

Scarlet Fever, by GEORGE F. DICK, M.D., and GLADYS HENRY DICK, M.D.; Chicago: Year Book Publishers, Inc., 1938. Price, \$2.00.

In *Scarlet Fever*, Drs. DICK and DICK submit to the medical profession a definite report on this disease of their results over a period of thirty years. This volume can be looked upon as one of the indispensable basic references on this contagious disease. The history of scarlet fever, its etiology, pathological anatomy, symptoms, varieties, complications, diagnosis, prognosis and treatment are taken up in the order mentioned. Next is considered the preparation of scarlet fever toxin, the skin test for susceptibility, prophylaxis against scarlet fever, antibacterial immunity, and local and oral immunity. A bibliographical list of 188 is cited. This small volume can truly be considered a complete treatise on scarlet fever.

Anemia in Practice, by WILLIAM P. MURPHY, A.B., M.D., associate in medicine, Harvard Medical School; senior associate in medicine, Peter Bent Brigham Hospital, Boston; consultant hematologist, Melrose Hospital, Melrose, Mass.; 344 pages with 41 illustrations; Philadelphia: W. B. Saunders & Co., 1939. Price, \$5.00.

Dr. WILLIAM P. MURPHY, the co-discoverer of the liver diet for pernicious anemia, has assembled in one small volume all vital information concerning the anemias. He has emphasized especially those facts and methods which during the last few years have proven to be most useful and practical in the treatment of the anemic patient. The general conclusions as outlined in this book are the result of both research in the laboratory and intimate contact with and treatment of many clinical patients. The more common and usual clinical pictures of anemia are emphasized at the expense of unusual cases which might lead to confusion. This has given a very fundamental and practical aspect to this small volume which should be of particular value to the medical student, intern, and the practicing physician. No attempt has been made to bring together a complete bibliography.

Endocrinology, Clinical Application and Treatment, by AUGUST A. WERNER, M.D., F.A.C.P.; 672 pages illustrated with 265 engravings; Philadelphia: Lea and Febiger, 1937. Price, \$8.50.

Because endocrinology is one of the newest and certainly one of the most interesting departments of general medicine, Dr. WERNER has developed in one volume a complete yet practical survey of this broad field. Dr. WERNER suggests that the general practitioner is lost in the subject of endocrinology because of (1) the newness of the subject; (2) the lack of definite information as to the possible number of hormones and their functions; (3) the intricate interrelationships of the secretions of the ductless glands; (4) the difficulty of application of the results of animal experimentation to the human, which, aside from scientific value of such work, is the ultimate object of these investigations; (5) the variation of the potency of hormonal preparations used; and (6) the difficulty of determining individual dosage, which is influenced by the degree of function of the glands of the patient, the individual susceptibility of the patient, cellular receptivity, interaction of other endocrine secretions, and the effect of general metabolic factors and disease processes in each individual.

With these points in mind, Dr. WERNER has developed a volume which attempts to make the internist a good clinical endocrinologist. The anatomical structure and arrangement of the autonomic nervous system is first considered and is then related to the endocrine glands in general. The main bulk of this book, however, is a separate consideration of each endocrine gland, its anatomy, physiology and secretions. In the last few chapters are included general clinical syndromes such as obesity, osseous metabolism, the skin and endocrines, the hair and the teeth.

Dr. WERNER's *Endocrinology* is neither a reference book nor a practical treatise on endocrinology that can be used to advantage by the general practitioner. It will take its place among the many other general books on endocrinology, but it cannot be considered superior to many of them.

Future Meetings

MEDICAL ASSOCIATION OF MONTANA

The Medical Association of Montana will hold its annual scientific meeting at Butte, June 28, 29, 30. The program will be conducted under the chairmanship of Dr. J. J. Malee, Anaconda, with the assistance of Dr. P. E. Kane, Butte, and Dr. E. H. Lindstrom, Helena.

Guest speakers, from Washington University School of Medicine, St. Louis, Missouri, follow below.

Dr. Ernest Sachs, professor of clinical neurological surgery.

Dr. Dalton Keets Rose, associate professor of clinical genito-urinary surgery.

Dr. James Barrett Brown, associate professor of clinical surgery.

Dr. Charles Darrell O'Keefe, assistant professor of clinical obstetrics and gynecology.

Dr. Carl Vernon Moore, assistant professor of medicine.

The complete program of the meeting will appear in the June issue of the *JOURNAL-LANCET*.

PROGRAM

THE NORTH DAKOTA STATE MEDICAL ASSOCIATION MEETING

May 8, 9, 10, 1939

Fargo, North Dakota

May 8, 1939

Meeting of the House of Delegates.

Meeting of the North Dakota State Board of Health.

May 9, 1939

MORNING SESSION

9:00 Diagnosis and Management of the Surgical Gallbladder. E. M. Jones, M.D., St. Paul, Minn.

9:45 Maternal Mortality in North Dakota. John H. Moore, M.D., Grand Forks, N. Dak.

10:15 View Exhibits.

10:30 Medical Conditions Complicated by Pregnancy. Ralph A. Reis, M.D., Chicago, Ill.

11:15 Syphilis—Problems in the Treatment of Syphilis. H. E. Michelson, M.D., Minneapolis, Minn.

AFTERNOON SESSION

2:00 Dermatology for the General Practitioner. H. E. Michelson, M.D., Minneapolis, Minn.

2:45 Medical Legislation. L. W. Larson, M.D., Bismarck, N. Dak.

3:15 View Exhibits.

3:30 Diagnosis and Treatment of Eye, Ear, Nose and Throat Conditions Which Are of Particular Interest to the General Practitioner. A. D. McCannel, M.D., Minot, N. Dak.

4:15 Office and Hospital Management of Ano-rectal Diseases. L. A. Buie, M.D., Rochester, Minn.

May 10, 1939

MORNING SESSION

9:00 Emergency Orthopedic Problems. H. J. Fortin, M.D., Fargo, N. Dak.

9:45 Virus Diseases, U. S. Public Health Department.

10:30 View Exhibits.

10:45 An Approach to Some Common Behavior Problems. F. C. Rodda, M.D., Minneapolis, Minn.

11:15 Diagnosis and Treatment of Cardiac Emergencies. F. J. Hirschboeck, M.D., Duluth, Minn.

AFTERNOON SESSION

2:00 The Indication and Technique of Artificial Pneumothorax, Thoracoplasty and Extrapleural Pneumothorax in the Treatment of Pulmonary Tuberculosis. G. A. Dodds, M.D., San Haven, N. Dak.

2:45 Arterial Hypertension—Prognosis and Management. S. Marx White, M.D., Minneapolis,

3:30 View Exhibits.

4:00 Diagnosis and Treatment of Gastro-intestinal Hemorrhage. F. J. Hirschboeck, M.D., Duluth, Minn.

GREAT NORTHERN RAILWAY SURGEONS' ASSOCIATION

The Great Northern Railway Surgeons' Association will hold its 1939 meeting at Glacier Park Hotel, Glacier Park, Montana, June 30 and July 1.

Officers of the association are: Dr. E. H. Frost, Willmar, Minnesota, president; Dr. R. E. Weible, Fargo, North Dakota, first vice-president; Dr. W. F. Sihler, Devils Lake, North Dakota, second vice-president; Dr. H. W. Goehrs, St. Cloud, Minnesota, third vice-president; Dr. R. C. Webb, Minneapolis, Minnesota, secretary-treasurer.

AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS

The 24th annual meeting of the American Association of Industrial Physicians and Surgeons with the American Conference on Occupational Diseases and Industrial Hygiene will be held at the Hotel Statler, Cleveland, Ohio, June 5, 6, 7, and 8, 1939. A program of timely interest and importance will be presented by speakers of outstanding experience in all of the medical and engineering problems involved in industrial health. A cordial invitation is extended to all whose interests bring them in contact with these problems. Information regarding hotel accommodations, etc., may be obtained from A. G. Park, Convention Manager, 540 North Michigan Avenue, Chicago.

THE AMERICAN CONGRESS ON OBSTETRICS AND GYNECOLOGY

The first American Congress on Obstetrics and Gynecology is to be held in Cleveland, Ohio, September 11 to 15, 1939.

Minnesota State Board of Medical Examiners

Julian F. DuBois, M.D., Secretary
St. Paul, Minnesota

DOCKET OF CASES

Mankato Physician Enters Plea of Guilty

Re: STATE OF MINNESOTA vs. ARTHUR W. ECKSTEIN, M.D.

On April 8, 1939, Arthur W. Eckstein, M.D., of Mankato, Minnesota, entered a plea of guilty to an information charging him with the crime of abortion committed on or about October 15, 1938, in the City of Mankato. Dr. Eckstein was also arraigned on a previous conviction (1934), and at the conclusion of which he was sentenced by the Honorable Harry A. Johnson, Judge of the District Court, to a term of not to exceed four years in a state penal institution. The Court was advised by legal counsel for the defendant, that Dr. Eckstein's license to practice medicine had been revoked by the Minnesota State Board of Medical Examiners on December 16, 1938, for procuring, aiding and abetting a criminal abortion. Counsel also stated that Dr. Eckstein was employed by a wholesale pharmaceutical house of Milwaukee, Wisconsin, and that he was engaged in sales work for that concern in the eastern half of Iowa. Following a lengthy plea by Dr. Eckstein's lawyer, the Court suspended the sentence and placed Dr. Eckstein on probation in charge of the State Board of Parole. The Court warned Dr. Eckstein that in 1934 he had served a sentence in the State Prison for a similar offense, and that any violation of his probation, would result in his having to serve the entire sentence.

Dr. Eckstein was born at New Ulm, Minnesota, December 8, 1888. He graduated from the Medical School at Northwestern University in 1912. He was first licensed in Minnesota, by examination, in the same year, but had his license revoked in 1934, following his pleading guilty to a similar offense. Despite the fact that he was permitted, upon his release, to take the medical examination for a new license, and was subsequently granted a license, he again became involved with the law over the performing of a criminal abortion, resulting in the present criminal charge and the revocation of his license by the Medical Board on December 16, 1938.

Minneapolis Physician Convicted of Manslaughter

Re: STATE OF MINNESOTA vs. GEORGE F. LEMKE

On February 25, 1939, a jury in the District Court of Hennepin County, returned a verdict of guilty against Dr. George F. Lemke, who formerly maintained offices at 512 Pence Building, Minneapolis. Dr. Lemke was charged with manslaughter in the first degree following the death, on December 10, 1938, of a 22-year-old St. Paul girl. The indictment against Dr. Lemke charged him with the death of the girl following a criminal abortion.

On March 3, 1939, Judge W. W. Bardwell sentenced Dr. Lemke to a term of 5 to 20 years in prison in connection with this case. Dr. Lemke's lawyer announced that an appeal would be taken and the Court granted a stay of 30 days in which to perfect the appeal. Dr. Lemke's license, as a physician and surgeon, was revoked by the Minnesota State Board of Medical Examiners on February 11, 1939, following a hearing held before the Medical Board as the result of the death of this girl.

The case was well handled for the State of Minnesota by W. G. Compton, Peter S. Neilson and Howard T. Van Lear, Assistant County Attorneys.

News Items

The attention of members of the American Student Health Association is called to an article on "Health in Colleges," by Jesse Feiring Williams, which appeared in the April, 1939, issue of *The Journal of Higher Education*. Dr. Williams presents an excellent resume of the findings of the Second National Conference on College Hygiene. All those interested in student health work will want to read this article.

Dr. Rolla Stewart of Minneapolis presented two papers before the Nicollet-LeSueur County Medical Society at St. Peter, Minnesota, April 18, 1939. The subjects of his addresses were: "Recent Developments in the Treatment of Compound Fractures," and "Internal Fixation of Fractures of the Neck of the Femur."

Dr. R. F. Hedin of Red Wing, Minnesota, has been awarded the annual prize of \$250 given by the Chicago Surgical Society for original clinical and investigative work. Dr. Hedin's essay was entitled "Polypoid Disease of the Colon."

Dr. W. T. Judge, Milbank, South Dakota, was elected president of the Whetstone Valley medical society at the meeting held March 28, 1939. Dr. P. D. Peabody, Jr., of Webster, was named secretary. At this meeting, Dr. W. H. Karlins, Webster, spoke on "Fractures of the Hand" and Dr. P. D. Peabody, Sr., on "Bone Tumors."

The new \$67,000 Tracy, Minnesota, hospital will be open within the next few weeks.

Dr. J. H. Garberson, Miles City, Montana, addressed the Mount Powell medical society recently on the subject of "Head Injuries."

Dr. Laurence G. Pray, Valley City, North Dakota, has accepted a two-year appointment as instructor in pediatrics at Babies Hospital in connection with Columbia University, New York City. For the past two years, Dr. Pray has been resident pediatrician at Johns Hopkins hospital, Baltimore, Maryland.

Dr. Loyal Davis, professor of surgery at Northwestern University, was the principal speaker at the annual dinner of the St. Paul Surgical Society April 13, 1939.

Dr. Paul A. O'Leary of Rochester, Minnesota, has been appointed a member of the National Advisory Health Council by Secretary of the Treasury Morgenthau. The council consists of eight members who serve as an advisory committee to the surgeon general of the U. S. public health service in formulating the plans for improving the health of the nation.

Dr. Ruth Boynton, director of the Student Health Service, University of Minnesota, has been appointed to the state board of health by Governor Stassen.

Dr. A. R. Sorenson, Minot, North Dakota, has accepted the office of city health officer succeeding Dr. J. L. Devine.



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smokers are turning to Chesterfields
for what they really want in a cigarette...*refreshing mildness...better taste*
...and a more pleasing aroma.

Dr. L. H. Rutledge has been named chief of staff at St. Mary's hospital, Detroit Lakes, Minnesota. Dr. O. O. Larsen is vice chief and Dr. Arnold Larson, secretary.

Dr. Donald L. Peterson has opened an office in Fargo, North Dakota. A graduate of the University of Minnesota medical school, Dr. Peterson held a three-year surgical fellowship at the Mayo Clinic, and was assistant in surgery to Dr. Virgil Counsellor. He is a native of Fargo.

Dr. George Turman of Missoula, Montana, was named chairman of the state board of health, succeeding Dr. E. M. Porter of Great Falls, at the board's semi-annual meeting held in Helena, April 6, 1939. Dr. L. H. Fligman of Helena was named vice-president.

Dr. E. M. Larson, Great Falls, president of the Montana Tuberculosis association for the past several years, was reelected for another one-year term at the 23rd annual meeting of the association held in Helena, April 8, 1939. According to L. L. Benepe, deputy registrar of vital statistics, who made his report at the meeting, tuberculosis as a cause of death in Montana during 1938 dropped to eighth place.

Dr. A. F. Dworak, formerly of Montgomery, Minnesota, has moved to St. Paul.

Dr. Samuel Miller and Dr. Roy Lynde, Ellendale, North Dakota, have been reelected president and secretary, respectively, of the Southern District Medical Society.

Dr. V. J. Larose, Bismarck, was elected president of the North Dakota Anti-Tuberculosis association at the 30th annual meeting held in Bismarck, April 4, 1939. He succeeds Dr. E. A. Pray of Valley City, who was named vice-president. Dr. J. Grassick of Grand Forks was reelected honorary president and Governor John Moses, honorary vice-president.

Three Minnesota cities, Winona, Hibbing and Virginia, were announced as winners of merit awards in a 1938 city and rural health conservation contest conducted by the Chamber of Commerce of the United States in cooperation with the American Public Health Association. The announcement was made in Washington, April 18, 1939.

The Montana board of medical examiners has granted seven out-of-state physicians licenses to practice medicine in Montana. According to Dr. S. A. Cooney, Helena, secretary of the board, licenses were granted by reciprocity to Drs. O. J. Graham, Salt Lake City; Harrison D. Huggins, Hillsboro, Oregon; Frank A. Mills, Powell, Wyoming; J. P. Ohlmacher, Missoula; W. D. O'Gorman, Warm Springs; and J. R. Thompson, Ravenna, Ohio.

The Minnesota Pathological Society heard Dr. Jesse G. M. Bullowa of New York City speak on "The specific treatment of the pneumococcal pneumonias: the choice of a remedy," April 18, 1939, at the University of Minnesota Medical School Institute of Anatomy.

The maternal child welfare committee of the North Dakota State Medical Association cooperating with the health department, has arranged a series of one-day conferences for the purpose of curbing infant mortality. Dr. R. E. Pray, Fargo pediatrician, is discussing advanced methods of caring for premature infants before physicians and nurses in 16 communities. The conferences opened at Bismarck April 19 and will continue until May 26, when a meeting will be held in Fargo.

An all-day postgraduate course in the care of mothers and babies was given for the physicians of Winona, Minnesota, and surrounding communities April 26, 1939. The course was arranged under the auspices of the state department of health, the University of Minnesota and the Minnesota State Medical Association. The faculty for the course included Dr. R. D. Mussey, Rochester, Dr. E. D. Anderson, Dr. C. J. Ehrenberg and Dr. E. S. Platou of Minneapolis.

Minnesota's physically handicapped children will receive medical examination and advice at several field clinics planned for May and June by the Division of Services for Crippled Children of the State Board of Control. The schedule is as follows: Crookston, May 13; Austin, May 20; Detroit Lakes, June 3; and Aitkin, June 10. All physically handicapped children under 21 years of age who cannot pay for medical care are eligible.

Dr. R. H. Wilcox, formerly with the South Dakota State Health Department at Pierre, is now in Astoria, Oregon.

The Vancouver Medical Association is sponsoring summer school clinics June 6 to 9, 1939, at Vancouver, B. C. Information may be secured from Dr. W. W. Simpson, secretary, 203 Medical-Dental Bldg., Vancouver, B. C.

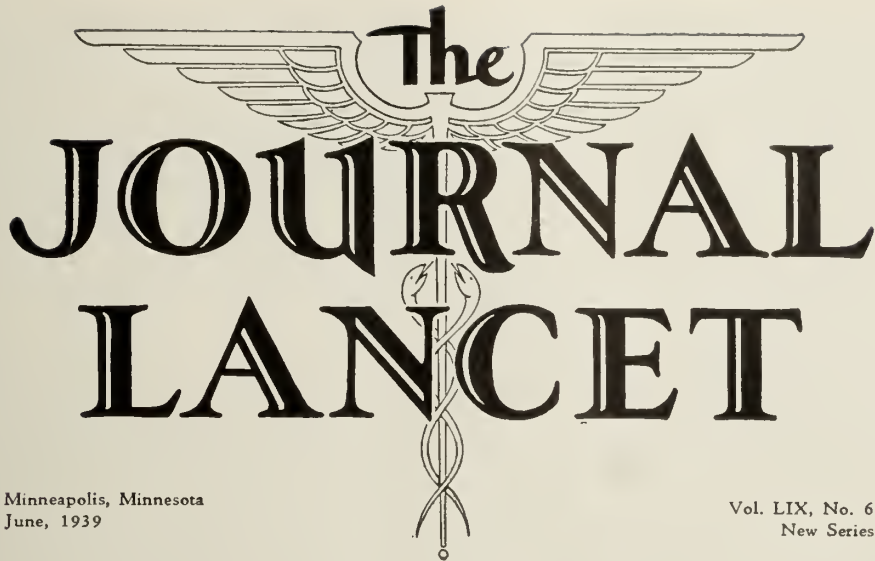
Dr. David Gavis, Minneapolis, is now associated with Dr. R. F. Werner in International Falls, Minnesota. Dr. Gavis was graduated from the University of Minnesota Medical School in 1936.

Necrology

Dr. J. M. Scanland, 65, former superintendent of the Montana state mental hospital at Warm Springs and prominent Montana physician for many years, died March 14, 1939, at his home in Imola, California. Dr. Scanland had been president of the Napa state hospital at Imola the past 15 years.

Dr. Henry H. Helk, 60, Minneapolis, Minnesota, died March 23, 1939. Dr. Helk was former chief of staff at St. Barnabas hospital.

Dr. Herbert F. Kenny, 52, died at his home in Waukesha, Wisconsin, April 14, 1939. Dr. Kenny, who practiced in St. Paul, Minnesota, for 12 years, had lived in Waukesha since 1933.



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The Significance of Antenatal Care in Reducing Maternal Mortality*

Frank L. McPhail, M.D.†
Great Falls, Montana

DURING 1937 and 1938 it has become safer for women to bear children in Montana. However, the maternal death rate is still too high. It is significant that, excluding abortions, 78 per cent of the maternal deaths occurred in women who had had little or no antenatal care. Adequate antenatal care plays an important part in reducing the number of deaths occurring during pregnancy and labor. Good obstetrics at the time of delivery plays an equally important rôle. Antepartum care cannot be adequate until it is available to all, nor can it be of great value until all doctors accepting obstetrical patients are prepared to offer good obstetric service. The public must be educated to seek and demand a high standard of obstetric care. The public must be educated to seek medical advice early in the pregnancy. The doctor must be prepared to take a complete history and make a thorough physical examination. It is important to understand the patient physically and mentally. Then, preventive medicine may be practiced. Minor variations from normal should be carefully recorded and checked at intervals. Mild heart disease may become serious, or occult kidney disease may lead to a toxemia. A careful record of unusual findings will suggest more careful observation and serious complications may be averted. In 1937 four major complications, abortion, sepsis, hemorrhage and toxemia, accounted for nearly 80 per cent of all maternal deaths in

the United States. Adequate antepartum care will materially reduce the deaths from these causes.

ABORTION

It is not within the scope of this paper to discuss criminal abortion. Therapeutic abortion is life saving at times, but the risk must be carefully weighed. Experienced obstetrical judgment is most valuable, and frequently individuals having grave lesions may be permitted the joy of motherhood if competent attention is rendered during pregnancy.

Threatened and habitual abortion can be treated, and in many instances prevented. Bedrest and sedation are essential. Progesterone and vitamin E should be included in the treatment. Some report good results from thyroid extract. A patient giving a history of habitual abortion should be at bedrest. A diet rich in vitamins and low in calories should be given. An individual at bedrest does not need a high caloric diet. Coitus and douches are prohibited. Phenobarbital in small amounts is a satisfactory sedative. One milligram of progesterone given intramuscularly every third day may prevent uterine contractions. The diet should be reinforced by wheat germ oil.

Inevitable abortion may be treated either expectantly or by more radical methods. The treatment must be influenced by the presence of either hemorrhage or infection.

*Read before the Mount Powell Medical Society, Anaconda, Montana, January 16th, 1939.

†Great Falls Clinic.

PUERPERAL INFECTION

Whether infection follows abortion or labor, the outlook is serious. Sulfanilamide has had a dramatic effect in many cases. This drug is of benefit in many streptococcal and other infections. It is not without danger and should be used with caution. It is a new drug not thoroughly understood.

A healthy body is the best safeguard against infection. The antenatal period provides ample time to prepare a woman for her confinement. Our aim should be to keep the patient in good health and prevent complications. Each individual should receive an adequate, well-balanced diet. She should exercise moderately and rest when tired. Focal infections should be located and treated. Infected tonsils or abscessed teeth may be potent sources of endogenous infection. All local disease as vulvitis, vaginitis and cervicitis should be treated. Cervical and urethral smears should be made if necessary. Many irritating discharges may be treated by a 1 per cent lactic acid douche. Cervical erosions often disappear as a result of this simple treatment. The patient should be carefully instructed to avoid coitus, tub baths, and self-examination during the eighth and ninth month.

Epidemics of infectious disease are hazardous. One maternal death occurred in Montana during 1938 from sepsis developing after delivery in a home in which scarlet fever was present.

Anemic patients are more susceptible to infection than those having a normal blood picture. I have made frequent blood counts in 1,000 consecutive patients and have found almost 40 per cent have a hemoglobin below 70 per cent. This group has shown a higher morbidity than the remaining patients. It seems logical that we should improve the blood as a prophylactic measure against infection. Enteric coated ferrous sulphate tablets have been better tolerated than other iron preparations. The incidence of unpleasant gastro-intestinal symptoms is low.

HEMORRHAGE

The patient should thoroughly understand that bleeding at any time during pregnancy is abnormal and that any bleeding, no matter how slight, should be reported at once. A correct diagnosis is important but preparation to combat the hemorrhage should be made before any examination is attempted. In the first trimester, abortion or ectopic pregnancy are suspected. Once an ectopic pregnancy is diagnosed, surgery should not be postponed as a fatal hemorrhage may occur. In the presence of shock, either normal saline or 5 per cent dextrose may be given during operation. Blood may be collected from the patient's abdomen and injected as an autotransfusion. We have replaced 2,200 cc. of blood in this manner.

Placenta praevia and premature separation of the placenta are the common causes of hemorrhage late in pregnancy. The patient should be hospitalized if any sign of bleeding is present. Her blood should be typed and cross-matched with the blood of possible donors. If bleeding is slight it is better to postpone examination.

Many patients may go to normal delivery if left alone. Procrastination is not safe until the patient is in the hospital with every facility at hand for immediate operation and blood transfusion. If bleeding is profuse, the patient should not be examined until all preparation for operation and transfusion are complete. Never examine a bleeding patient at home unless hospitalization is impossible. Then, all preparation for emergency treatment should be made before risking an increased hemorrhage from the examination. If the blood loss has been severe, transfusion should be started before operation.

TOXEMIAS

Hyperemesis Gravidarum. For convenience, hyperemesis gravidarum is grouped with the toxemias. The cause of this condition is not known. Continuous vomiting results in serious loss of chlorides and body water. Dehydration results in decreased urine water and if urine water is insufficient, urine solids are retained.

If treated in the early stages, much can be done to prevent hyperemesis gravidarum. In addition to small frequent feedings and sedation, definite instructions are important. Approximately one level teaspoon of salt will replace the chlorides lost in 12 ounces of vomitus. The patient may measure each emesis and calculate the amount of salt necessary to replace the chlorides lost. Most patients are able to ingest the salt by the use of gelatin capsules. The daily fluid intake should be at least 1500 cc. plus the volume lost by vomiting. This may be attained by giving tap water retention enemata if necessary. Following this regime early vomiting may be controlled and hospitalization is rarely necessary. If vomiting has been present for some time, treatment may have to be more energetic. The classical symptoms of hyperemesis gravidarum, i. e., weakness, nausea, vomiting, drowsiness, stupor and even twitching, are also the symptoms of low body chlorides. A knowledge of body chlorides may be inferred from a determination of plasma chlorides.

As body water and body chlorides are lost, less water is available to the kidneys and retention of urine solids results. The treatment should be directed toward replacing chlorides, and providing the body with water. As water is supplied the kidneys will excrete retained urine solids. It is essential to make plasma chloride determinations. Coller¹ and associates have worked out a formula which makes it possible to determine the amount of salt necessary to bring the plasma chlorides to a normal level. He found that: "For each 100 mg. per cent that the plasma chlorides need to be raised to reach the normal of 560 mg. NaCl per 100 cc., the patient should be given 0.5 Gm. of sodium chloride per kg. (or 0.2 Gm. of salt per pound) of body weight." As each 1,000 cc. of normal saline contains 8.5 Gm. of salt, it is comparatively simple to furnish the individual with the necessary chlorides.

Frequently if the calculation is not made, too little salt is given and nausea and vomiting continue with an added loss of chlorides. Normal saline and 5 per cent dextrose in distilled water given intravenously rapidly replace the chlorides and overcome body dehydration.

Small feedings are usually retained after a few days. Sedation may be obtained by the use of soluble phenobarbital subcutaneously.

Nephritis and Late Toxemias of Pregnancy. Severe nephritis is a rare complication late in pregnancy as the severe nephritic rarely conceives and if conception does occur, usually aborts. The treatment of nephritis and the late toxemias is the same. Retention of urine solids is common to all types. If sodium is retained edema will be present; if not, hypertension and albuminuria may be present without edema. As urinary retention progresses, the cells of the body are dehydrated even though edema is present.

The toxemias may be controlled and if treated early, prevented. Large amounts of water are necessary to promote urinary excretion and furnish water for the cells. Every woman should be instructed early in the pregnancy to measure her urine once a week. She should drink enough water to bring the total 24-hour output to at least 3 pints. If edema, albumin, or high blood pressure should develop, salt and soda bicarbonate should be prohibited and enough fluid ingested to bring the daily urine output to 3 quarts. It must be remembered that occult edema may be suggested by a sudden increase in weight.

If the patient has a severe toxemia, or if convulsions are imminent when first seen, hospitalization is necessary. It is usually wise to omit feeding until after a period of observation. Sedation may be obtained by the use of soluble phenobarbital subcutaneously, or by phenobarbital by mouth. Large amounts of fluid may be given intravenously, subcutaneously or orally. If a parenteral route is chosen, always use 5 per cent dextrose. *Never* use normal saline if edema is present, nor in a toxemia unless the plasma chlorides are found to be low. Fluids should be given in large amounts until the urine output is large, then in sufficient amounts to permit a daily urine output of at least 3,000 cc. I have given over 8,000 cc. of fluid in 24 hours with excellent results to patients having convulsions. No circulatory embarrassment has been noted.

DISCUSSION

The maternal death rate is still too high in Montana although it has been lowered in the past two years. The trend of medical practice is toward preventive medicine and it is in this tendency that we have strong hope of reducing both the mortality rate and maternal morbidity. We recognize that every expectant mother should have good medical care during the pregnancy, labor and puerperium. The public must be educated to seek medical care early in the pregnancy. Once that contact is firmly established the physician is in a position to see that care during the labor and puerperium is satisfactory. Each community will present a unique problem. Montana is a large state, sparsely settled; some areas seriously stricken by drought, others so far reaching that medical facilities are far distant. As an example, Cascade County has an area of 2,722 square miles, yet only one physician is located outside of the city of Great Falls. The modern highway and automobile have gone a long way toward solving the question of distance. Changing economic

trends are developing new solutions for the unfortunate. It is in this new development that the medical profession must play a leading role. It hardly seems fair to ask a County Commissioner to decide what foods a pregnant woman should eat or which patient should be hospitalized.

Montana has an excellent Public Health Nursing organization. The medical profession is not making adequate use of this service. Some may have the impression that the Public Health Department is anxious to practice medicine. This feeling should be eradicated as the Department of Public Health has neither the desire, nor the funds to enter the field of medical care. As the individual looks to his physician for advice in medical matters, so the public looks to the medical association for progressive action in medical matters. If all medical men accepting obstetric cases would emphasize the need for early examination and frequent visits during the pregnancy, it would not be long until the importance of early antenatal care would be well known. To this end the Public Health Nurse may be a great aid to the physician. She stands ready to accept orders from any physician, make visits to the patient's home and report back to the physician. In this way the importance of the antepartum call could be stressed. Patients living in remote districts could be contacted and many home treatments might be carried out without adding to the present tax burden. Few doctors have any idea what this service might mean in counties where it is available. The Public Health Nurse can be a potent ally to the medical profession in educating the public to realize the importance of antenatal care.

We know what causes death most frequently in the puerperal state, and we have discussed some measures to prevent these deaths. We must impress upon our people the importance of guarding against trouble, then we must be prepared to give good obstetric care. This should be the concern of each county medical unit. Planned programs to act as refresher courses are extremely valuable. Today it is possible for women to go through pregnancy with little or no danger. The state and county medical societies must assume a definite responsibility if improvement is to result. The public must be educated, the medical profession must be prepared to render adequate service and the community resources planned so that all mothers can receive adequate care.

GENERAL SUGGESTIONS TO IMPROVE ANTENATAL CARE

1. The public must be taught to appreciate the importance of early antenatal examination.
2. The first examination must be complete and include a careful history, physical examination and blood Wassermann.
3. Insist upon regular antenatal visits. Do not allow the visit to become routine. Be on guard to prevent systemic disease, as well as obstetric complications.
4. Instruct the patient to report at once if any important danger signs develop. This will prevent many serious complications.

5. Try to prevent abortion. If abortion becomes imminent, prevent serious blood loss and guard against infection.

6. Infection may be prevented more readily than it can be treated. Be sure that every effort is being made to improve the patient's general health.

7. In early vomiting, replace chlorides and water as they are lost.

8. In hyperemesis gravidarum, make plasma chloride determinations and administer sufficient normal saline to

restore a normal plasma chloride level and a normal fluid balance.

9. In toxemias of late pregnancy, force fluids. Obtain a daily urine output of at least 3,000 cc. Limit salt and prohibit sodium bicarbonate.

10. If hemorrhage is present, hospitalize at once. Never examine a bleeding patient until preparation for transfusion and operation are complete.

REFERENCE

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Fractures of the Spine and Pelvis*

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IN considering fractures of the spine and pelvis, it is well to review briefly the anatomy of these organs in order that the various injuries which occur to them may be more readily understood. The spine is a flexible column composed of 33 bones, the upper 24 of which are true vertebrae and are classified into seven cervical, 12 dorsal and five lumbar vertebrae. The lower nine are fused in the adult into two large bones, the upper one the sacrum and the lower, the coccyx. All of the true vertebrae consist of various divisions. The body, which is a short cylindrical section of cancellous bone, is well braced internally by its Haversian system and is well adapted to its function of carrying the body weight. The neural arch projects backward from the body as a ring and protects the spinal cord which runs through it, and to this neural arch are attached several processes. The spinous processes project backward. The lateral processes project sideways. The superior and inferior articular processes project respectively upward and downward on each side and in the dorsal spine other processes, the fovea, provide the articulations of the heads of the ribs. These bones are all bound together very solidly by a number of tremendously strong ligaments which we may classify as the intra-spinous, supra-spinous, the anterior spinous and the intervertebral discs. These latter organs are a remnant of the notochord lying between the bodies of the vertebrae as hollow fibrocartilaginous discs filled in the center or nucleus pulposus by fluid. This whole series of ligaments not only serves to bind the bones together but to form a cushion to absorb the shock. Entirely surrounding this already strong structure is an enormous group of muscles which further serve to brace it. The pelvis in the adult consists posteriorly of a triangular shaped bone, the sacrum which embryonically consists of fused vertebrae, and laterally the two innominate bones. These

three structures are very firmly bound together with several ligaments and muscles both at the articulations between the sacrum and innominate bones posteriorly and around the two innominate bones in front at the symphysis.

In addition to this brief anatomical survey, it is wise to remember that from a developmental standpoint the human body was not made to stand erect but originally was supported at four corners. The sacrum even in the adult when standing erect lies at a more or less horizontal plane with the floor so that in order to have the body erect the spine must make an angle of between 60 and 90 degrees between its articulation with the sacrum and the lower ribs. One must bear this developmental fact in mind or it is hard to visualize injuries to the spine at the lumbosacral articulation.

Obviously it is impossible in a short time to make anything like a systematic review of all the injuries which can occur to such large and diverse organs as the spine and pelvis. For that reason only the commoner injuries will be discussed to emphasize particularly their treatment and also the newer trends in treatment which have occurred the past two or three years. For the purpose of review, it will be necessary to divide the subject to some extent and I have chosen to make this classification not on an anatomical basis but on a basis of practical diagnosis and treatment as follows: first, compressed fractures of the bodies of the vertebrae; second, fracture dislocations either with or without neurological symptoms; and third, fractures of the pelvis.

Kummel,¹ in 1895, described a wedging of the vertebrae in the back following injury which he thought to be an absorptive osteitis and did not recognize it as a crush fracture. Texts on fractures prior to about 1915 made little mention of compressed fractures of the bodies, partly because, in that more or less pre-automobile age, they were not common, and partly because

* Read before the Medical Association of Montana state meeting at Lewistown, September 5-6, 1938.

X-ray equipment and experience was not sufficiently developed to diagnose them. It was not until 1917 when Hartwell² and later Brackett³ reported some cases that the frequency of this injury was recognized. Since that time a great deal of study has been given to this injury and during the twenties the fracture was usually recognized when it was suspected and various rather inefficient methods of treatment were described. In 1929, Davis⁴ dramatic article advising an actual reduction of the fracture and describing a method by which this can readily be done re-emphasized its importance. Since Davis' original article, three or four other methods of reduction have been described which are good.

The question of etiology and diagnosis must first occupy our attention. The causation of these fractures is jack-knifing of the spine caused either by a fall from a height lighting on the heels or buttocks or by hyperflexion. Any force, in fact, which acts to compress the body of the vertebra in its vertical axis may cause this injury. Actually, falls from heights and automobile accidents are the most common offenders. However, as to be noted later, compressed fractures can and do occur in senile decalcified individuals simply from straight lifting on a weakened vertebra. The anatomy of the spine is such that these fractures usually occur in the 11th and 12th dorsal and all the lumbar vertebrae. The neck is so flexible that if force enough is applied to it to cause a compression, usually a fracture of the neural arch will occur and the thoracic spine, of course, is so well protected by ribs that compressed fractures do not often occur here. However, they do occur occasionally both in the cervical and dorsal spines.

The question of diagnosis is an important one, because if these fractures are diagnosed and treated early, resulting temporary disability is not great, and the resulting permanent disability in uncomplicated cases is practically nil. There is no positive way to make a diagnosis except by taking clear X-rays in both planes. It is well, however, to be on the lookout for this injury following any major trauma to the back. The most constant symptom is pain and the most constant sign is muscle spasm. Occasionally, a slight gibbus is present over the fractured vertebra which is often tender; more rarely root pains ranging around into the abdomen will be suggestive. Another useful diagnostic procedure is forcibly flexing the head on the chest with the patient lying on a hard table. The consequent tightening of the posterior spinous ligament in the presence of a fracture will often localize pain at the fracture point. Lateral X-rays will invariably make the diagnosis, but sometimes if they are taken immediately following injury in a patient who has not been up, the amount of compression may be slight and will require a careful measurement of the anterior border of the suspected vertebra for comparison with the anterior borders of the vertebrae above and below it to determine compression.

The ancient rule for the treatment of fractures and dislocations is that of obtaining reduction by reversing the causal force. In this injury, the causal force is hyperflexion so that reduction must be accomplished by hyper-

extension. Fortunately, there are factors in the anatomy of the spine which make this practical and efficient. In the first place, the neural arches and the superior and inferior articular processes are dense cortical bone, and are seldom broken in a compressed fracture. In the second place, the anterior spinous ligament which runs the full length of the spinal column on its ventral surface is an unusually strong structure and will stand a direct pull of many hundred pounds before breaking, and in the third place, the intervertebral discs are very firmly attached to the cancellous bone of the body of the vertebra. It is evident then that if sufficient hyperextension is made, the crushed bony body of the vertebra will be carried with the adherent intervertebral disc. It is further evident that hyperextension will be stopped when the normal length of the anterior spinous ligament is reached, and further, that the posterior spinal joints acting as fulcrum will protect the spinal cord and its coverings.

With these facts in mind, Davis, in 1929, devised a mode of reducing these fractures and holding them in hyperextension by putting a sling around the patient's ankles with the patient lying prone on a hard table. Then the feet, legs and pelvis are raised off the table with a block and tackle until all of the patient is suspended except the shoulders. Such a maneuver places the spine in complete hyperextension and reduction is accomplished, after which anterior and posterior plaster shells are applied. Light anesthesia is required for the maneuver. The patient is kept in a cast in hyperextension for some eight to twelve weeks and then is fitted with a hyperextension brace and allowed up. The brace should be worn for another eight to twelve weeks depending entirely upon X-ray evidence of regeneration.

After the pioneer work done by Davis, there were three or four other methods described for obtaining the same result. One of them, the so-called "jack" decompression, was devised and described by us⁵ in 1931. This method accomplishes reduction with the patient in the dorsal position on a fracture table with the buttocks resting on the peroneal plate and the thighs and legs in rather marked extension so that the pelvis is tipped forward. A metal plate or saddle is then placed under the patient at the point of fracture, the table is dropped out of the way and by gradually raising the "jack", complete hyperextension can be obtained. With this type of decompression, a circular cast is applied and if the fracture lies in the lower dorsal or upper lumbar areas, the cast does not need to include the thighs and the patient can be ambulatory inside of two weeks. The further follow-up treatment, use of the brace, etc., are, of course, the same.

Watson Jones⁶ a year or two later described still another method by which the back is hyperextended by having the patient lie on his face between two tables so that the torso sags forward between them. Hyperextension can be obtained in this manner very efficiently but it is difficult to hold the patient in position long enough to apply the plaster. The follow-up treatment, however, is the same, and if the cast can be properly applied, this

is an efficient method. It makes no difference whatever which method is used. They are all efficient and the after-care is the same. By the careful use of any of these methods, complete recovery from any compressed fracture of the spine should be expected.

There are a few complications requiring mention, however, because they are quite important. Cast sores or pressure sores should not develop as these people can usually be up, or if they cannot be, they can be turned on their sides or faces daily. Ileus, however, is a very common complication of compressed fractures in the back, probably due to some shock to the sympathetic nerves which lie anterior to the bodies of the vertebrae. This can be a very distressing complication, and is best treated by the withholding of fluids by mouth, giving intravenous 5 per cent glucose saline, use of hot stupes on the abdomen together with high enemas and prostigmine or some other smooth muscle stimulant, and if necessary duodenal drainage. Another and more serious complication is the development of fatty embolism. The embolism is heralded by the onset of what one might call an acute traumatic pneumonia, the symptoms resembling pneumonia except that the temperature is not so high and the white blood count is not so great. Treatment is that for any pneumonia and following the development of embolism, bed rest must be enforced. It is this complication which makes us loathe to allow these patients to be up on their feet for at least two weeks after the fracture is reduced. One other complication which should be mentioned is the so-called Schmorl's disease or rupture of the intervertebral disc and evacuation of the fluid from the nucleus pulposus. This does not occur often nor can it often be diagnosed immediately, but if these compressed fracture patients who have been decompressed continue having pain, especially after the casts or braces are off, a lateral X-ray will often show a narrowing of the intervertebral disc or its complete absence. If the nucleus is ruptured, but the disc is not completely destroyed, a painful back will result unless a fusion is done. It occasionally happens, however, that a disc is completely destroyed so that the bones adjacent to it become fused into one bone. When this occurs, of course, pain no longer exists and the patient is cured. This last is the only complication of compressed fractures which ever calls for surgical treatment, that is, the development of a traumatic Schmorl's disease in which the two fractured bones do not fuse.

Fracture dislocations of the spine, for the same anatomical reasons described above, usually occur either in the cervical spine or in the lumbar area, and these are far more serious to life and health than simple compressed fractures. Due to the marked variation in the anatomy of the cervical region and the lumbar region, they must be considered separately as treatment varies considerably in the two areas.

In the cervical spine, a history of a fall, or dive followed by pain and stiffness in the neck, numbness and tingling in the arms, paresthesias along the lesser occipital nerves and varying degrees of paralyses all are suggestive. It is important to remember that simply because

a patient who has dived into shallow water or who has fallen off a haystack is able to get up and walk about, and because there is no complete paralysis or even immediate partial paralysis, he may, nevertheless, have suffered a more or less severe injury to the cervical spine which requires a detailed examination. If, following such an injury, a patient is completely paralyzed, anyone, even a layman, would be quite sure that he had broken his back. If, however, he is not completely paralyzed but does complain of tingling in his arms, pain and stiffness in the neck, difficulty in swallowing, pain in the posterior scalp, etc., these signs and symptoms should warrant a careful roentgenological examination as a fracture of considerable severity and a surprising amount of displacement can occur in this area without either complete or partial paralysis immediately supervening. X-ray examination of the cervical spine should be complete. Incomplete examination with the X-ray is worse than none at all because of the false sense of security which it engenders. Such an examination must include a lateral X-ray taken with the patient sitting if he is able to sit, with the hands grasping the rungs of a stool below him to throw the shoulders out of the way, or if this is impossible, the picture must be taken with him lying on a hard table with a sling around either wrist, and assistants pulling the shoulders down out of the way.

The treatment of fracture dislocations in the cervical spine with or without paralysis, and with minor displacement, and the treatment of dislocations in the cervical spine providing there is reason to think the cord has not been irreparably damaged, has been well demonstrated by Brookes⁷ of St. Louis. It consists essentially of manipulative reduction of the displacement by traction with a head halter modified slightly to include the use of a head sling which holds the head and greatly facilitates the application of the cast after reduction has been completed. Reduction, naturally, should be checked with the X-ray both laterally and antero-posteriorly before the plaster is applied. A plaster of the Calot type is that usually worn and should be worn for a number of weeks depending on the position and extent of the fracture dislocation, the exactness of the reduction obtained, and the patient's age. This then is followed by some sort of convalescent collar which is worn while the patient is up and about, with a cotton collar at night. A cotton collar is essentially a heavy piece of quilting some two inches wide at one end and six inches wide at the other, which is wrapped tightly around the neck starting with the narrow end at the Adam's apple and firmly bound with a bandage. This device steadies the head much more than one would think and is extremely useful also as a first-aid transport device to protect the head against moving until the permanent dressing can be applied. It is much more comfortable and efficient than any type of sandbagging.

The treatment of fracture dislocation of the spine when fracture is severe and displacement is great, is better and more efficiently carried out by the application of traction. Traction for such injuries has been used for many years with a head halter. It has been only

moderately satisfactory for several reasons, the most important one of which is that the traction must be released when the patient eats and that the continuous pressure on the jaw is so great that extreme discomfort often necessitates the use of too little weight. A short time ago Crutchfield⁸ described the use of skeletal traction by imbedding tongs directly into the outer table of the skull. This has been a tremendous help in the treatment of neck injuries. The scalp is shaved and prepared, the width between the tong points is determined and novocaine is injected at these points and an incision made down through the periosteum. Holes $\frac{1}{8}$ inch deep are made through the outer plate with a guarded drill and then the tong points are engaged in these holes and firmly locked. Weights up to 25 pounds can be applied with absolutely no discomfort to the patient and with continuous traction. It is surprising what a nice replacement continuous traction in these severe fracture dislocations brings about when it is really continuous. When reduction is complete and has been so for a matter of two or three weeks, a cast is applied, and the remainder of the after-care parallels that previously described.

Neurological complications are extremely common and the question often arises when paralysis is at all severe, as to whether or not laminectomy should be done. The answer must depend on the neurological symptoms present and on whether the X-ray shows the spinal canal to be patent or not. Obviously, if the displacement is so severe that the cord is cut in two no type of surgical attack will be of avail. Pressure only on the cord results in spastic symptoms whereas complete section of the cord results in flaccid paralysis. This, unfortunately, is a most unreliable method of determining whether decompression is indicated or not because with only a partial cord lesion and often, in fact, with no permanent cord lesion at all, a complete flaccid, motor and sensory paralysis will sometimes persist for days below the lesion, and if surgery is to be of any use, it must be done promptly. Therefore, one must rely for answer to this question entirely on whether the neural canal is patent or not.

Fortunately, this problem can usually be solved by bi-plane and stereoscopic X-rays and by the use of the Queckenstedt test and certainly cervical laminectomy for fracture should never be done unless one or the other of these signs is definitely positive. The Queckenstedt test consists of doing a lumbar puncture at the third lumbar interspace. With a spinal manometer in place, the jugular veins are then compressed, which by causing a rise in the venous intracranial pressure, will, if the intrathecal space is patent, immediately cause a rise in the column of fluid in the manometer which on releasing pressure over the jugulars should immediately regain its former level. If, however, the fluid in the manometer does not rise or rises only slowly when pressure is applied to the jugulars, and if it does not fall or falls only slowly when pressure is released on the jugulars, then, of course, some interruption exists between the brain reservoirs and the needle. Usually in the case of a positive Queckenstedt test a laminectomy should be advised as it may do good. The same is true of the X-ray. If,

following reduction, the X-ray shows bony spicules or pieces of bone lying in the spinal canal, a laminectomy should probably be advised and the foreign bodies removed. Routine laminectomies or even semi-routine laminectomies on these injuries is certainly to be discouraged. The problem of whether to advise operation or not is a delicate one and except for these general outlines cannot be bound by any hard or fast rules of procedure.

Fracture dislocations in the lower dorsal and lumbar spines are caused by the application of tremendous force for the lumbar spine is tremendously braced with muscles and ligaments and the bones themselves are large and strong. Falls from great heights and automobile accidents are by far the most common causes. The diagnosis here is ordinarily not difficult for pain is intense, shock is usually present and varying degrees of paralysis almost invariably occur with the major displacements which most of these injuries show. The same principles of treatment apply here that apply in the cervical spine. They call for reduction and in this case prompt reduction instead of delay, so that nerve pressure may be released as promptly as possible. The displacement in fracture dislocations in the lower dorsal and lumbar spines varies tremendously in each individual case so no rule of procedure can be laid down. The principle of reversing the causal force still holds, however. Some of these fractures must be reduced with the patient on his face with heavy traction both on the shoulders and on the pelvis and oftentimes severe manipulation. Some must be reduced with the patient lying on his back, and some even with the patient lying on his side. The displacement as shown in the X-ray will suggest the proper maneuver but invariably traction in the long axis of the spine must be used and it must be efficient.

It is vital both from a standpoint of treatment and prognosis that we remember that the spinal cord proper terminates opposite the upper border of the second lumbar vertebra and that fracture dislocations below this region cause paralysis by pressure on the caudal nerves which are in effect peripheral nerves and will regenerate after a surprising amount of pressure. This makes the neurological outlook in these fractures considerably different from that in the cervical spine where pressure is applied directly to the cord itself. Here again in addition to stereoscopic antero-posterior and lateral X-rays, the Queckenstedt test should be used if operative interference is contemplated. The usual site of puncture is the third interspace which will show a block proximal to the puncture, but, of course, will not show a block distal to it, and, therefore, a modification of the Queckenstedt test called the reversed Queckenstedt test must be used. In doing a reversed Queckenstedt test the manometer is applied to the lumbar puncture needle exactly the same as for the ordinary Queckenstedt. A needle attached to a large syringe which is filled with normal saline is then introduced into the sacral hiatus. This does not penetrate the dura itself, but after the saline solution is expressed into the bony sacral canal, it will compress the lower end of the dural sac and so

cause a rise of fluid in the manometer. If the fluid does not rise when the saline solution is injected, one may be quite sure that a block exists below the lumbar puncture needle and manometer. Fracture dislocations in this region even with tremendous displacement will permit a really startling regeneration of paralysis, if even relatively good reduction can be obtained so that bony pressure on the caudal nerves is relieved.

Surgical fusion and bone grafts are never required in uncomplicated compression fractures and are seldom required in fracture dislocations in the cervical spine, for in this region the superimposed weight is slight. They are, however, often required in fracture dislocations in the lumbar spine, for the lower spine carries not only the entire weight of the body above it, but carries any weight the patient is holding or carrying in his arms. Surgical fusion here is done in the same manner in which it would be done for any other spinal condition requiring fusion.

Another type of fracture dislocation in this region which should be remembered is spondylolisthesis, a condition in which the fifth lumbar vertebra slips forward off of the sacrum. Injuries to the lower spine could be more readily understood if we would remember that the spine, due to our erect posture, makes nearly a 90-degree angle between the sacrum and thorax. The terrific shearing force placed on the articular processes of the lower lumbar vertebrae by this factor makes it possible for a spondylolisthesis to occur. This usually does not occur in a normal back even with considerable trauma, but developmental defects are common in this region and if the bony bridge between the neural arch and the body of the fifth is absent as it sometimes is, trauma may cause a slipping and if trauma is very severe and localized in this region, an actual fracture of both pedicles can occur with a complete slipping. It was thought, until recently, that the treatment of spondylolisthesis consisted in a fusion operation on the vertebra in the position in which it presented itself. The more generalized use, however, of skeletal traction in the past year or two has made it possible actually to reduce some of these dislocations by making traction in the long axis of the femur with the thighs bent on the abdomen to a right angle and the knees bent on the thighs to a right angle. That was done in this case, and has effected an accurate reduction of a complete spondylolisthesis in which the fifth lumbar was entirely slid off the sacrum into the pelvis.

One more injury to the spine proper should be mentioned in passing, that is a rupture of the intervertebral disc and a protrusion of part of it backward into the spinal canal. This injury has only very recently been recognized and undoubtedly occurs much more frequently than has been suspected in the past. Its diagnosis requires a very detailed neurological examination with injection of opaque oils into the spinal canal, but its presence may be suspected if, following a heavy lift, a sharp pain in the lower back is experienced which radiates down one or both legs and which is much aggravated by coughing or sneezing. The use of this opaque

oil is not recommended unless the reverse Queckenstedt is positive. This accident is amenable to surgical relief, but the subject in itself is so large that one cannot digress for its complete description.

Before leaving spinal injuries proper, it is well briefly to consider their first-aid care and transport. Injuries to the cervical spine should be treated with the utmost respect so that further displacement does not occur, and this is best done by careful transport of the injured person from the scene of accident on an ambulance cart in a dorsal position with a small pillow under the head and neck and with a sandbag on either side of the head encircling the neck. An efficient type of sandbag is simply a pair of socks filled with sand which can ordinarily be found at the place of injury. The natural curve of the neck follows the contour of the neck and makes a splendid first-aid immobilization device. If fracture of the dorsal or lumbar spines is suspected, patients should never be lifted by the arms or legs as this causes further compression of the spinal column and is almost certain to aggravate existing injury. Patients with suspected back injuries should be transported on the face which is easily done by simply rolling them over onto a blanket. Then, by lifting the blanket by its corners, the patient can be placed face down on an ambulance cart without any danger of disturbing the fracture. Needless to say, the well-meant efforts of bystanders who drag patients out of cars and throw them into back seats of other cars are more harmful than helpful. The old axiom of war transport applies here with great force, "Splint them where they lie."

Fractures of the pelvis involve a large organ in which almost any conceivable type of fracture may occur. For practical diagnosis and treatment one can arbitrarily divide these numerous fractures into first, fractures without serious displacement, and second, fractures with serious displacement. By far the greater number of fractures of the pelvis are in the ascending or descending ramus, or in both of them, and are accompanied by little if any displacement. These fractures so far as the skeletal injury is concerned are of no especial importance providing the patient can be kept in bed. They are accompanied by some pain although this is not great, and are to be suspected when, following injury, the patient complains of pain in the perineum, or has pain on abduction of the thigh, which maneuver tightens the adductor muscles, or complains of pain in the perineum when pressure is brought on both the anterior superior spines simultaneously. The diagnosis must be confirmed with the X-ray, which should be stereoscopic. These fractures would require no treatment at all if the patient would stay in bed for six or eight weeks. However, the pain from simple fractures of the rami has largely disappeared in a week or ten days, and unless confining dressings are applied these patients are likely to get up and start to walk which may, of course, force displacement. Therefore, it is wise to place them in a double spica cast or plaster pants extending from the knees to the lower ribs. The cast should be worn for some two months.

Fractures with displacement present an entirely different problem, and until the past few years a problem which was poorly solved by the surgeon. For instance, a fracture of the rami with a complete upward displacement of the entire ilium and a ruptured sacro-iliac joint would result in severe crippling if allowed to remain in this position. Until the advent of skeletal traction, there was no way enough force could be applied to the displaced innominate bone to bring it down into position as adhesive tape traction on a leg cannot be made heavy enough under ordinary circumstances to reduce the displacement. With the advent of skeletal traction, however, by applying force to the lower end of the femur through a Kirschner wire, a pull as high as 60 pounds can be put on the ilium in a direct downward direction which, if the bed is sufficiently elevated at the foot, will result in the course of 36 or 48 hours in a complete restoration of alignment.

Another type of fracture with severe dislocation which is not at all uncommon in these automobile days is a fracture through the acetabulum with a central dislocation of the head of the femur. Various methods of attempting to reduce this by weights and by manipulation, which for the most part have been futile, have been used. Here again, skeletal traction if applied in the proper directions will effect reduction. A stainless steel screw with a ring at the end is screwed into the trochanter major and a Kirschner wire is run through the lower femur. Thus, by adjusting varying degrees of weight at these two points their component will pull in any given oblique direction. For instance, with 10 pounds of weight pulling laterally on the trochanter and ten pounds of weight pulling directly down on the shaft of the femur, their component force would be equal to 20 pounds at an angle of 45 degrees from the vertical. Actually, most femoral necks make an angle of 135 or 140 degrees with the shaft, and, therefore, to make a component pull in the direction of the neck of the femur the weight on the trochanter should be less than that on the long axis of the femur. However, this can be adjusted to suit each individual case depending on the angle the neck of the femur makes with its shaft.

As a rule, manipulative reduction of fractures of the pelvis is either entirely inefficient or dangerous or both, for, when an attempt is made to force these bones out by rectal or vaginal pressure, the amount of force required is great, and, if enough force is applied to move the fracture at all, it is usually enough force to excoriate or rupture the rectal wall and make a very dirty, compound fracture out of what was to begin with a clean although serious injury. There is no need to describe other types of treatment for these severe fractures of the pelvis. The same principles apply here that apply to all other fractures.

Complications of fractures of the pelvis are common, although not nearly so common as textbooks would lead one to suppose. These injuries, especially those with serious displacement, are caused by great force so that some degree of shock is often present. They are com-

found more frequently than any other fracture except those of the jaw or skull, and when compound are compounded into the bladder or urethra. Every patient with a suspected major fracture of the pelvis should be immediately catheterized to determine the presence of blood. If blood is present, a most careful watch must be kept on him for the next few hours. If in the presence of blood the patient shortly begins to complain of distress in the lower abdomen and desires to urinate but is unable to do so, one must assume that he has a rupture of the bladder or urethra which may be either extraperitoneal around the neck of the bladder or intraperitoneal, in which case the rupture may be anywhere. The differential diagnosis can usually be made. With an intraperitoneal rupture shock is present. Either type requires immediate surgery, the only difference being that in an extraperitoneal rupture an ordinary cystotomy is sufficient while with an intraperitoneal rupture the bladder should be widely exposed, its wall sutured in layers, and the usual treatment for peritonitis started.

Rupture of the urethra is also sometimes present and may be diagnosed by the presence of bright blood in the orifice. This complication demands immediate surgery. An attempt should be made to pass a catheter into the bladder. If this goes past the rupture into the bladder, it should be left in place for about two weeks and daily weak irrigations of the bladder used. If the catheter will not pass into the bladder, it should be passed as far as possible and then a mid-line incision made in the perineum down to the tip of the catheter which will expose the rupture. The catheter is then continued up into the bladder, the urethral rupture sutured and the wound closed with deep drainage. Suprapubic cystotomy is sometimes necessary even after this maneuver if the rupture is severe.

If we remember that fractures of the spine and pelvis are treated by those same principles which govern the treatment of fractures elsewhere, and, if we remember that these injuries, serious as they sometimes appear, may oftentimes be greatly relieved or even completely restored by the application of these principles which we have reviewed today, a great deal of the apprehension felt by both doctor and patient when confronted with these injuries may be relieved.

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The Work of a University Psychiatric Clinic*

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THE following report attempts to discuss on the basis of 196 new cases admitted to the Psychiatric Clinic of the Hygiene Department of Harvard University during the academic year 1937-38, (1) the problems which Harvard students face, (2) the symptoms which those problems seem to produce in the students seeking help in the Psychiatric Clinic, (3) the way in which the psychiatrists have tried to relieve symptoms, and (4) results, in terms of academic standing which offers a convenient and objective, although not always pertinent, means of evaluating results.

Parenthetically it is of some interest to note the distribution within the several departments of the University of the patients of the Clinic. This is shown in the following table.

TABLE I.
Distribution Within the Several Departments of the University.

NEW PATIENTS		
Class	No. of Patients	No. of Visits
Class of 1941	43	184
Class of 1940	22	82
Class of 1939	18	58
Class of 1938	12	64
Out of Course	7	71
Graduate School of Arts and Sciences	30	105
Law School	41	153
Business School	4	16
Graduate School of Education	3	15
Divinity School	1	2
Special Students	2	14
Dental School	1	2
School of Public Health	1	1
Medical School	1	5
Faculty	3	29
Not Enrolled	2	5
Episcopal Theological School	1	2
Engineering School	3	24
Graduate School of Design	1	1
Total	196	833

The sources from which patients were referred to the Clinic are indicated in the following table.

TABLE II.
Sources From Which Patients Were Referred to the Clinic and Number of Cases Seen.

Source.	No. of Cases
Medical Clinics within the University	133
Voluntary	20
Dean's Office	19
Faculty	6
Miscellaneous (friends, other students, etc.)	18
Total	196

PROBLEMS

The different problems which patients of the Psychiatric Clinic seem to be dealing with, more or less unsuccessfully, and which, therefore, are initial factors in psychiatric symptom formation, fall into five general categories:

1. Problems of organic disease.
2. Economic or financial problems.
3. Academic and vocational problems.

4. Problems of current inter-personality relationships.
 - A. Family (particularly parents and siblings).
 - B. Problems involving relationships with the opposite sex: courtship, marital, sexual.
 - C. Social (including racial) problems.
5. Problems of internal personality organization.
 - A. Psychoneurotic structure.
 - B. Cyclothymic structure.
 - C. Schizoid structure.
 - D. Atypical structure.

In a sense all Harvard students are continuously facing, adaptively and usually successfully, all of the above problems, particularly those in the categories 2, 3 and 4. It is only when the problems are approached or dealt with by the student in an inadequate or socially unacceptable manner that psychiatric symptoms develop. Realizing this, it is apparent that the danger of too great a simplification must be avoided; rarely is a single simple problem to be held directly responsible for all of a patient's symptoms. In the following discussion it should always be kept in mind that in the personality of each student the psychiatrist is dealing with a dynamic equilibrium, often delicately balanced, made up of extremely complicated constitutional and experiential components and faced with a confusing multiplicity of difficult problems in the attempted solutions of which something has gone wrong and symptoms appear.

1. Problems of Organic Disease.

There were seven cases in which organic disease appeared to play the sole or principal rôle in symptom formation and four cases in which it seemed to be a factor although not the most important one. An example of the former is to be found in the single case of multiple sclerosis and of the latter in the case of a Freshman whose dietary restrictions because of moderately severe diabetes mellitus played an important, although secondary, rôle in producing a psychiatric picture of such severity as to necessitate his withdrawal from college.

2. Economic Problems.

As was the case in previous years poverty appeared to be the main cause of difficulty in only two patients. One of these was a Junior whose job during the summer of 1937 had not been as profitable as expected and who found it necessary to carry considerable part time employment to make both ends meet; the other patient was a Freshman whose coming to Harvard from Louisiana was probably ill-advised, largely for financial reasons although family and personality problems were involved as well. These two cases alone do not give an accurate picture of the rôle played by the economic factor among the patients of the Clinic; in twenty-five other cases the influence of poverty could be discerned as a contributing element although not the principal one.

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3. *Academic and Vocational Problems.*

It has been possible to distinguish clearly a small group of students who, quite apart from all other considerations, do not possess a sufficiently high intellectual endowment to do satisfactory academic work. This small group which is designated "borderline college intelligence" should never have been admitted to college; their attempt to compete on an unequal basis usually leads to academic failure and a chain of distressing symptoms. Related to this special group of the intellectually under-endowed is the type of student who, although possessing adequate intelligence, has drifted into a field of concentration for which for one reason or another he is not suited and hence he does inadequate work; if such a person can be wisely directed into a field for which he has a real aptitude, a second rate career of frustration and potential failure can often be avoided. These two related and specialized problems seemed to play a major rôle in 26 of the patients, and to be operative although in a minor way in 37 others.

It is particularly in the recognition and precise formulation of this sort of problem that our psychologist, Dr. Wells, is proving helpful. An example that is not atypical of the cases under this category is to be found in a 19-year-old Sophomore who was attempting to force himself into a rather cut-and-dried business career and was concentrating in the field of economics mainly at his father's instigation. Actually since about the age of 7 the boy's principal interests had consistently been in the theater and in acting for which he has considerable talent although he had only vaguely realized this. In concluding his report on this patient Dr. Wells stated: "At present his aptitude and the trend of his interest appear definitely artistic, and there are neurotic features suggesting that his forcible diversion from these might cause serious upset in his general adjustments. From the standpoint of business, one should attempt to capitalize the talents that he has, in their value to the business world. He might even develop the capacity to manage the business side of his own special interests. But there is little indication of his being suited to a career in business for the sake of business. History is not lacking in cases where defective aptitudes were more than overcome. But in these cases there was a direction of interest, and a determination that does not appear here. Indeed he might easily set up a conscious or unconscious will not to succeed. In the present it would seem wisest to help him become balanced in developing the undoubted talents that he has."

4. *Problems of Current Inter-personality Relationships.*

A. *Family.* In view of the fact that most of the patients of the Psychiatric Clinic fall into the age group of late adolescence it is not surprising that many of them are in a state of considerable dependence—emotional as well as in other ways—upon their families, and therefore are particularly sensitive to discord, turmoil or whatever unusual or disturbing circumstances might concurrently exist in the family background. In eight of the cases seen last year, disturbed family relationships appeared to be the main source of the trouble which

brought them to the Clinic; in 23 others a family difficulty contributed to symptom formation without being the most important factor.

B. *Problems of Sex and Sexual Relationships.* This apparently heterogeneous group includes such fundamentally related problems as the technic of courtship, homosexuality, impotence and autoerotism. In most of the 20 cases, where questions of a sexual nature seemed to be predominant in etiology, the problem of reconciling the crudescent psychosomatic demands of the sex drive with the prevailing group and individual moral codes and standards of sex conduct was usually an urgent one—frequently unclearly formulated by the student himself. In 34 other cases sexual problems in one way or another played a secondary contributing rôle in the development of symptoms.

C. *Social (and Racial) Problems.* The driving desire to belong to the *in*-group and the striving to conform to group standards for the sake of personal security in group relations may or may not be manifestations of a herd instinct. Whatever their source there can be no doubt that these forces play an important rôle in determining human behavior, especially during the adolescent period. In 12 of the psychiatric cases the sole or chief problem seemed to be one of failure to belong to acceptable social groups and symptoms seemed to arise out of inferiority feelings from social exclusion of one form or another. In 31 other cases this sort of problem could be discerned as of subsidiary importance. An example is that of a Southern boy who found himself rooming in the Freshman dormitory surrounded by (to him) aliens from Groton, Exeter, St. Paul's and Milton. The story of his desperate and unsuccessful attempt to understand and to conform to the standards of those about him—to belong—is both ludicrous and pathetic. This social problem is a crucial one for many Jewish and other "non-Aryan" students.

5. *Problems of Internal Personality Organization.* This, the largest general group of problems with which the patients of the Psychiatric Clinic have to deal (96 cases all told), is a familiar one to the psychiatrist and comprises those cases where in the formation of the personality mosaic, constitutionally or during infancy, childhood and early adolescence, the pieces have been abnormally put together. The boys in this group are "imperfect" and vulnerable before they come to Harvard.

Many different types of personality organization can be and have been described in the psychiatric literature; for the practical purposes of our work in the Clinic it has seemed most convenient to distinguish three fairly generally recognized types of pathological personality structure, any one of which can constitute a problem to its possessor, and to have a fourth ("waste-basket") category for those mixed and atypical problem personalities which are not readily classified under one of the three main types.

A. *Psychoneurotic Structure.* In 39 of the patients a psychoneurotic type of personality seemed, more or less independently of external factors, to be the primary

problem leading to symptom development. In 23 other cases a psychoneurotic personality structure was plainly operative but in a secondary way.

B. *Cyclothymic Structure.* In 17 cases the personality was clearly of the type characterized by tendencies to affective disturbances and in those cases this tendency seemed to be the chief or sole problem in 12 and a secondary problem in 5 patients.

C. *Schizoid Structure.* In eight patients the primary problem seemed to be one of dealing with a schizoid personality organization; in two other cases this type of personality played a rôle in symptom formation but one subsidiary to other problems. The relative proportions of these cases at least suggests that where a schizoid type of personality exists as a problem it is apt to be evaluated as of primary importance in the production of symptoms.

D. *Atypical Structure.* This large and quite heterogeneous category of problem personalities includes such cases as would ordinarily be diagnosed psychopathic personality or constitutional psychopathic inferiority together with mixed types which combine affective with psychoneurotic or schizoid features. Thirty-seven patients seemed to be grappling with atypical personalities as major problems while in thirteen other cases atypical personalities were factors subsidiary to other problems producing symptoms.

6. *Unknown or no Psychiatric Problems.* This group which contains 25 patients includes cases where the data were insufficient to permit accurate classification together with a few cases (referred from Freshman physical examinations, prophylactic check-up, etc.) who, by no means without problems, nevertheless were handling those problems in such a way that no symptoms were produced.

A recapitulation of the foregoing discussion of the problems which Harvard men face and which bring some of them to the Psychiatric Clinic is given in the following table.

TABLE III.

Problems	Primary Problem in:	Secondary Problem in:
1. Organic disease	7 cases	4 cases
2. Economic problems	2 cases	25 cases
3. Academic and vocational problems	26 cases	37 cases
4. Problems of current inter-personality relationships	40 cases	88 cases
A. Family	8 cases	23 cases
B. Sexual	20 cases	34 cases
C. Social (including racial)	12 cases	31 cases
5. Problems of internal personality organization	96 cases	43 cases
A. Psychoneurotic structure	39 cases	23 cases
B. Cyclothymic structure	12 cases	5 cases
C. Schizoid structure	8 cases	2 cases
D. Atypical structure	37 cases	13 cases
6. Unknown or no psychiatric problems	25 cases	

SYMPTOMS

The symptoms which the foregoing problems produced in the 196 new cases seen in the Psychiatric Clinic last year are indicated in the following table.

TABLE IV.

Symptoms	Primary Symptom in:	Secondary Symptom in:
Nervous system	16 cases	69 cases
A. Headache	3 cases	11 cases
B. Fatigability	6 cases	18 cases
C. Insomnia	3 cases	31 cases
D. Other nervous system symptoms	4 cases	9 cases
Gastro-intestinal	1 case	36 cases
Cardiovascular	0 cases	17 cases
Respiratory	3 cases	5 cases
Genito-urinary	2 cases	11 cases
Skin	2 cases	2 cases
Intellectual functions (memory, disturbances of consciousness)	8 cases	30 cases
Affective functions	109 cases	52 cases
A. Anxiety	99 cases	38 cases
B. Depression	9 cases	13 cases
C. Elation	0 cases	1 case
D. Mixed	1 case	0 cases
Distortions (delusions and hallucinations)	1 case	5 cases
Obsessions, compulsions and phobias	4 cases	17 cases
Impaired or inadequate work (not due to above symptoms)	32 cases	6 cases
Other behavior disorders	7 cases	22 cases
No or unknown symptoms	11 cases	

The frequency with which anxiety is encountered among the patients is rather striking; one gains the impression that in many cases severe, paralyzing anxiety is the primary psychological or emotional response to certain types of problems and that then as a result of anxiety secondary disturbances and symptoms arise; particularly in the gastro-intestinal tract, but also not infrequently in the other organs of the body innervated by the autonomic nervous system. The resulting clinical picture which confronts the psychiatrist may thus be a very complicated one involving primary and secondary factors with the original source of trouble largely obscured in the general melee. Any problem where the personal security of the individual in his intimate group relations is at stake—whether the "danger" comes from an inter- or intra-personality source—seems particularly apt to lead to anxiety formation.

Aside from the implications of the preceding important generalization, no very close correlation appears to exist between the type of problem and the ensuing symptoms although the rather high incidence of a depressed mood in cases where an economic problem is involved may have some significance.

THERAPY

In spite of the emphasis which has been placed in the foregoing discussion upon problems and symptoms, the main purpose for which the Psychiatric Clinic exists and actually the main function which it fulfills is that of treatment. A student comes into the Hygiene Department and because of the apparent emotional or psychological nature of his difficulties (or perhaps more frequently because of the absence of any indications of an organic or physiological process) he is referred to the Psychiatric Clinic. There an attempt is made to reconstruct the development of the clinical picture, to formulate the factors that have taken part in symptom formation and finally, by utilizing whatever means are available, to do something to restore the normal balance and thus to bring about the disappearance of symptoms.

In most instances, fortunately, adequate treatment need not be a very complicated procedure. Sometimes just the taking of a careful history, the clear formulation

of a previously obscure problem coupled with kindly and authoritative reassurance—the simplest form of psychotherapy and all taking place in two or three interviews—are enough to resolve completely very disturbing symptoms. Each of the 196 new patients seen in the Clinic last year received this treatment and in most instances it was effective and sufficient. The average number of visits per patient throughout the year was 4.5. The following table indicates the distribution of the 1130 psychiatric interviews.

TABLE V.
Visits.

42 students made 1 visit.	3 students made 7 visits.
48 students made 2 visits.	7 students made 8 visits.
30 students made 3 visits.	2 students made 9 visits.
22 students made 4 visits.	3 students made 10 visits.
13 students made 5 visits.	3 students made 11 visits.
11 students made 6 visits.	3 students made 12 visits.
9 students made more than 12 visits.	

From our experience we feel that it is particularly into the realm of "social therapy" that an extension of the therapeutic efforts of the Psychiatric Clinic can be made with a reasonable expectation of considerably increased effectiveness. In the first place the opportunities for utilizing to therapeutic ends the many social facilities that exist at almost every college (the Communist Club, debating societies, American Student Union, Phillips Brooks House and its associated activities, musical and literary clubs, etc., etc.) are very great. In the second place the available time, space and personnel for the more "orthodox" psychotherapeutic procedures are and must remain strictly limited and, in any event, are of dubious utility under the special conditions that exist at Harvard. Certainly in many of the 43 cases where social problems seemed to be involved "social therapy" would appear to be the treatment of choice, and even in those cases where problems of internal personality organization are primary, social measures can often be very effectively used in the management.

From the experience obtained last year in the eleven cases where social measures were enlisted therapeutically the results were certainly encouraging enough to warrant an extension of this type of therapeutic experiment. An example of "social therapy" effectively applied is to be found in the case of the diffident, loose-ended and career-less Sophomore who found in a settlement house Boy's Club, which he helped to run, inspiration for concentrating in the field of political economy and, incidentally, a decrease in his shyness as well.

The problem of treatment which the Psychiatric Clinic faces is not in the main that of dealing with large numbers of psychotic patients or even with severe and complicated neuroses. Where such patients do come in contact with the Clinic, the Clinic's duty is to diagnose

accurately and quickly and to recommend non-admission to, or exclusion from, the University with proper recommendations to the boy's family. It is only very rarely that the University can be considered to have any responsibility whatever for the management of these "major" psychiatric problems; where they exist or are apt to develop they should be recognized early rather than late in a boy's college career and be dealt with promptly. It should be unnecessary to emphasize the legitimate importance of concentrating on the Freshman class in the hope of avoiding the tragedy of wasted time and energy involved in a "major" psychiatric disaster later in the Senior class or in Graduate School.

RESULTS

As the years progress and the results of psychiatric treatment in specific instances become apparent one gains the distinct impression that by and large the patients who come to the Psychiatric Clinic are being helped, and helped by the treatment they receive. It is very difficult, however, for obvious reasons, to evaluate objectively the results of such treatment.

The following table gives the academic fate of the new cases seen last year.

TABLE VI.
Results.

Satisfactory work for year (including graduation or degree awarded)	116 (59%)
Patients whose work was unsatisfactory but connection was not severed	32 (17%)
Patients who failed at end of year and University connection was severed	20 (10%)
Patients who withdrew from the University	28 (14%)

Although "results" expressed in the above way are ideally objective it is very doubtful if they are an altogether reliable index of the effects of treatment. Some of the patients who withdrew from the University should be considered, from a purely medical point of view, as therapeutic successes, since not infrequently just by withdrawal a complete disappearance of symptoms was brought about. Yet in an academic sense such cases must ordinarily be considered as failures. On the other hand many of the cases whose academic work for the year was satisfactory must still be counted as unsuccessfully or incompletely treated because of the persistence of symptoms which, although disturbing enough to cause the boy to seek psychiatric help, were still not sufficiently handicapping to jeopardize his academic standing.

At present on the basis of three year's work it is our feeling that probably the only reliable guide to the progress and results of psychiatric treatment is the clinical judgment of the psychiatrist who has been treating the patient. Such clinical judgment does not lend itself readily to statistical summary.

Are Herniorraphies as Successful as They Should Be?*

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THE repair of inguinal hernias is a subject which interests almost everyone who does general surgery. In Cook County Hospital the records show that about 10 per cent of all the major surgical procedures are undertaken for the cure of some form of hernia. The great majority of these hernias occur in the inguinal region. The patient is much more interested in the permanency of the repair which he is to undergo than he is in any other fact except possibly the amount of risk which he takes in having a major operation.

A great many of the profession were somewhat shocked by a recent report from one of the leading clinics that nearly 25 per cent of the repairs which were done for direct inguinal hernias proved unsuccessful. The majority recurred within the first year. In the indirect type of inguinal hernias, recurrence is not nearly so frequent. This can be readily understood when a study is made of the fundamental defects which contribute to these two types of inguinal hernia. In an indirect hernia the essential difference from normal is found in the presence of a sac occupying the same position with relation to the cord structures that the processus vaginalis testis occupies in fetal life. Unless such a hernia is permitted to exist for a long time and produce secondary changes by pressure or traction, a cure can be assured if a careful ablation of the sac is done.

In the direct hernia, the principal defect is in the parietes and the sac is a secondary contribution. The transversalis fascia gradually thins out and its fibers rupture or separate to produce a hole through which the hernial sac emerges. Ablation of the sac in these cases leaves one with the difficult problem of closing the hole in the overstretched, thin transversalis fascia. This transversalis fascia bears the same relationship to the abdominal wall that the cotton fabric layer does to the automobile tire. The elasticity of the peritoneum and the muscles render these structures of little use unless the defect in the transversalis fascia can be repaired. The transversalis fascia plays an exceedingly important part in maintaining the conformation and security of the abdominal wall. It is a part of the endo-abdominal fascia which lines the entire abdominal cavity. Physically it is quite strong, somewhat elastic, but when once torn it is almost as hard to repair as the head of a snare drum.

A STUDY OF THE USE OF FASCIAL GRAFTS

There has been for some time an increasing interest shown in the study of the healing of fascia in the repair of various anatomical defects. Some of these studies have dealt with the normal healing of approximated structures such as occurs when the internal oblique muscle is sutured to Poupart's ligament. The nature of this union has been an issue of dispute for several years.

*Read before the Medical Association of Montana state meeting at Lewistown, September 5-6, 1938.

Coley¹ states that a firm fibrous union is the usual result of their approximation by suture. McNealy,² Andrews,³ Pitzman,⁴ and many others have repeatedly called attention to the flimsy character of the union between these structures following the commonly accepted methods of hernial repair. In their observations at operations and at autopsy, they found that in most cases the internal oblique muscle and Poupart's ligament were united by only a few fibrous bands which could easily be separated by blunt dissection. It was striking that such a weak union was commonly found in individuals whose hernias had remained cured.

Seelig and Chouke⁵ undertook some studies and experiments to demonstrate the extent and character of fascial and muscle healing under conditions quite similar to those occurring in operative hernial repair. In their animal experiments several very constant and important points were brought out. They found that when the internal oblique muscle was sutured to Poupart's ligament, as is usually done in a hernial repair, that separation occurred soon afterwards. They comment on the weak character of the union between parallel fibers of muscle and fascia and between muscle and ligament.

Gallie and LeMesurier⁶ likewise interested themselves in the healing of fascia. They showed that a simple incision in fascia will be followed by perfect healing provided no undue tension is present. If, however, the incision be subjected to tension, the defect will be covered with loose areolar tissue similar to that covering fascia elsewhere. They further showed that removal of the loose areolar tissue from the surface of the fascia with overlapping of the layers resulted in a firm union.

Koontz⁷ made another step forward when he showed by his experiments that muscle will heal firmly to fascia when the contiguous portions have been freed of their overlying loose areolar tissue. He also demonstrated that by the cutting away of a small strip of the edge of the internal oblique and suturing this to the edge of Poupart's ligament, which had been denuded of areolar tissue, that an exceptionally firm union would result. Microscopic examination of the union showed that the connective tissue fibers of the fascia had united with similar fibers derived from the epimysium, perimysium and endomysium of the muscle. This union corresponds to the simple healing of fibrous tissues. He concluded that the overlying veil of loose areolar tissue was the important barrier to firm union.

Either independently or stimulated by the foregoing experimental work, there have been devised many operations for the repair of hernia which make use of these established principles of healing. Roberts and Roberts⁸ describe a method of suturing a reflected portion of the aponeurosis of the internal oblique to Poupart's ligament. The object is to unite fascia to fascia. Koontz and others⁹ describe a method of suturing the internal

oblique muscle to Poupart's ligament after each has been stripped of loose areolar tissue. Some thirty years ago McArthur¹⁰ suggested that strips of fascia taken from the external oblique aponeurosis be used as sutures to unite the internal oblique muscle to Poupart's ligament in the repair of inguinal hernia. This was more recently advocated by McEachern.¹¹ Gallie and Le-Mesurier⁶ have devised sutures made of strips of fascia which they suggest may be woven in an interlacing manner through the tissues to repair defects in the abdominal wall.

These methods are directed toward securing a firm fibrous union of structures which are to form a buttress against the bulging peritoneum. It is common knowledge, however, that in the majority of indirect inguinal hernias there exists little, if any, necessity for increasing the strength of the abdominal wall. The high ligation and removal of the sac allows the opening in the transversalis or endo-abdominal fascia to contract about the cord, thereby restoring this region to its normal relations. This contributes to the restoration of the valvular apparatus which is very important in protecting against the dynamic forces¹² that produce a hernia. Connell¹³ called attention to this fact some twenty years ago, and again in a recent article. That high ligation of the sac will alone effect a very great number of permanent cures is attested to by Lameris,¹⁴ Pitzman,⁴ and others. The late Dr. A. J. Ochsner, many years ago, called attention to the natural tendency of the femoral ring to contract following removal of the hernial sac.

Andrews³ recently called attention to the importance of the endo-abdominal or transversalis fascia in hernial repair. He describes a method of closing the defect in this structure and suggests that although that portion close to Poupart's ligament is too lax and thin to be of much value in repair, the thinness is always quite local and it is practically never necessary to go more than 2 to 3 cm. away from Poupart's ligament to find fascia of ample strength. He further states that he has found the transversalis fascia loose, elastic and movable in this area, which permits of its being pulled down to Poupart's ligament with a minimum of tension.

While much thought has been directed to the repair of inguinal hernia, postincisional and other forms of ventral hernias have not seemed to stimulate the same interest. From our work, we are inclined to believe that the success or failure depends in a large measure upon the efficient closure of any defect in the endo-abdominal fascia. Unlike the defects of the abdominal wall found in inguinal hernia, it is often impossible to approximate the edges of the large ventral hernial defects on account of their wide separation. It becomes necessary, therefore, to devise some plastic operation for their proper closure. Surgeons have apparently given much thought to methods directed toward the use of the rectus sheath or the fascia of the external oblique in the assembling of buttresses to the bulging peritoneum and defective endo-abdominal fascia.

Other methods suggested include the implantation of fibers of animal fascia,¹⁵ massive fascial grafts, fascia

transposition,¹⁶ living sutures made of fascia,⁶ and more recently the use of preserved fascia grafts inserted into various layers.¹⁷

In our recent study we interested ourselves in two related problems in the repair of ventral hernias. The first concerns the position a graft should occupy in the abdominal wall. The second concerns the behavior of the grafts. With regard to the first problem, we were impressed by the difficulty of producing hernias in experimental animals. Even the destruction of large segments of the abdominal wall was seldom sufficient to produce hernias in dogs. When the endo-abdominal fascia was injured large hernias were produced. A proper closure of this layer outweighs all other factors combined in insuring repair. If the defect is too large to allow of closure without undue tension, then some form of graft must be used. When a graft is used, it should be insinuated between the peritoneum and endo-abdominal fascia with the edges of the graft extending beyond those of the defect. Where this is impossible or not expedient on account of anatomical difficulties, it may be placed just without the endo-abdominal fascia so that its edges overlap the edges of the defect. These two sites we believe are practically the only ones which will produce any considerable number of cures. One may occasionally be rewarded by success where a transplant is placed in the sheath of the rectus or in the external oblique fascia. Such cures evidently depend more on good fortune than on sound technic.

The second problem, that of using preserved grafts of fascia, seems to us worthy of consideration. In many instances there are decided disadvantages to the employment of autogenous grafts. Preserved grafts may be used in the whole or as suture strips.

Experimental Work. In our experimental work on dogs we used grafts taken from dogs previously operated on and from human cadavers. The grafts had been preserved for from three weeks to three months in 70 per cent alcohol. These grafts were sutured into defects of the abdominal walls of dogs. For suture material we used black silk. In these experiments we found that practically all of the grafts were rather rapidly invaded by the surrounding tissue cells and blood vessels. A complete vascular film of loose areolar tissue was soon thrown across their upper and lower surfaces and from these small vessels penetrated between the graft fibrils. In the older grafts it was apparent that live tissue was gradually replacing the grafts. Our work is in accord with similar work reported by Koontz.¹⁸

SUMMARY

Our experimental and clinical work seems to strengthen our impression that an intact transversalis fascia is exceedingly important in preventing the development of any type of direct hernia. We are likewise of the firm conviction that in the cure of such direct hernias, attention should be directed to the repair of the defect in the transversalis fascia. We feel that in the use of grafts or transplants their position should be either between the peritoneum and transversalis fascia or just outside this fascia with their edges extending beyond those of

the defect. In those cases where there is some valid objection to the employment of autogenous fascial grafts, we believe that preserved grafts may be used to good advantage.

CONCLUSIONS

1. Clinical application of the recent studies of the healing of fascia will serve to improve the treatment of hernias.
2. The position of fascial grafts with reference to the layers of the abdomen is very important.
3. Preserved fascia may be used for the repair of fascial defects when for any reason autogenous grafts cannot be used.

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The Hygiene of Physical Education Activities*

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THE hygiene of physical education activities is the part played by those activities in the production, improvement, maintenance and defense of the somatic, mental and social health of the participant. They may indeed influence the mental health and the social health of the spectator when such activities come under his observation in the form of sportsmanlike, competitive athletics or in the pertinent column of a fair-minded sports writer.

Physical education activities are exercises of the whole individual. They exercise at one and the same time his body, his mind, and his personality. They may injure his health or they may favor and promote his health. Physical education activities are practices of hygiene when they lead the participant to form and maintain habits that construct and defend his health. These hygiene values of physical education activities depend on the satisfaction of certain requirements to which I may make only brief reference in the time allotted me.

Competent Individual Health Service. The first requirement for the satisfactory hygiene of physical education activities is that the individual shall receive a competent health examination, competent consequent health treatment if necessary, and competent consequent advice as to his program before he undertakes physical education activity, and this individual health service should be repeated at appropriate intervals afterward. This requirement of a competent individual health service is an essential to a satisfactory hygiene of physical

education activities in whatever age period the individual may be—infancy, childhood, youth, maturity, or in later years. A competent examination in search of information concerning the status of somatic health, of mental health, and of social health of the individual can be made only by a high-class physician specially prepared for such service in the age period involved.

Competent Environmental Health Service. The second requirement for the satisfactory hygiene of physical education activities is that they shall have a favorable physical, biological and societal environment. Such environment can be secured and maintained only by professionally prepared men and women. Scientific specifications for the hygiene of favorable environment vary with the different age periods involved—infancy, childhood, youth, maturity, and the aged.

Competent Service for the Prevention and Care of Physical Education Injuries is the third requirement for the hygiene of physical education activities. We know a good deal about the prevention and care of traumatic athletic injuries in colleges and universities. We are accumulating much information concerning physical education injuries in secondary schools and to some extent in elementary schools. Statistical records give disturbing information concerning the common occurrence of accidents in the home. But most of this knowledge, important as it is, has to do with traumatic injuries. We lack a great deal that we hope some day to know about the prevention and care of injuries to the mental and social health of the individual participant in physical education

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activities, particularly in the significant years of infancy and childhood. The first few years of the life of an individual are the most important years of all his life for the prevention of injury to his present and future mental and social health.

Competent Prepared Leadership. The fourth requirement for the hygiene of physical education activities is prepared, competent leadership whether the leader be a mother or father of an infant or child; a play leader; a teacher of physical education; a physical director; an athletic director; a coach; the family physician; a school doctor; a college or university physician, or a team physician. Such preparation should include for each leader a knowledge of the fundamentals of human biology, stressing the inclusion of human physiology, and a knowledge built thereon of at least elementary psychology and social psychology; their applications in the principles and practices of hygiene and in physical education. And, with all, this prepared competent leadership in physical education activities requires a knowledge of and a skill in the art of teaching appropriate to the age period involved.

Physical Education Activities as Practices of Hygiene. Having satisfied the requirements upon which the hygiene of physical education activities depends, these activities become habit-forming experiences that construct and defend the somatic health, the mental health and the social health of the regular participant. These activities become then practices of somatic hygiene, practices of mental hygiene, and practices that construct and defend wholesome, social personality. In the short period remaining at my disposal I shall try to outline the main items involved in these practices of hygiene.

Physical Education Activities as Practices of Somatic Hygiene. Let me remind you first, that physical education activities are exercises of the somatic functions of the individual. They are autonomic and voluntaristic and passive, mild, or vigorous exercises of (1) the voluntary muscles; (2) the brain, spinal cord, peripheral nervous system, and the autonomic nervous system;¹ (3) the endocrine glands and other glands; (4) the heart and blood vessels; (5) the organs of respiration; (6) the heat regulatory organs; (7) the excretory organs; (8) the organs concerned with the supply of fuel foods, other foods, food accessories, water, inorganic salts and oxygen, all of which are, and every one of which is, essential to physical education activities and all of which are, and every one of which is, necessary for the maintenance of the life and therefore the health of the individual.

Let me remind you further that favorable physical education activities stimulate metabolism—they MUST stimulate metabolism. They MUST stimulate nutrition, growth,¹ and development within the limits of the biological heritage of the individual.

And let me remind you, too, of the effects of deficiency or deprivation of physical exercise. You need only to recall the children you have known who have

suffered the effects of infantile paralysis. Or perhaps you yourself have had a fractured arm or leg and have spent several weeks under the immobilizing influence of a splint. Do you remember what happened to the unused muscles in infantile paralysis or in consequence of immobilization? I need not labor the point.

The facts that I have placed before you justify me in the expectation that you will agree with me when I state that the somatic hygiene of physical education activities involves not only a consideration of the physiological effects of the exercise of skeletal muscles but also of a number of other somatic involvements such as respiration, nutrition, water supply, vitamin and inorganic salt requirements, excretion, and rest.

Physical Education Activities as Practices of Mental Hygiene. Next, let me refer briefly to the formation and practice of habits favorable to the mental health of the participant in physical education activities—the activities of physical education that produce, improve, maintain, and defend the mental health of the individual.

Biological research has proved that all protoplasmic cells of whatever sort possess certain fundamental properties in common. Every human life begins as a single protoplasmic cell, a living fertilized ovum about one one-hundredth of an inch in diameter, formed by the union of two living germ cells. In common with all protoplasmic cells, the single-celled human being possesses sensitivity. Every cell of the multicellular human organism produced by successive mitoses of that first cell is sensitive to stimuli from its internal and its external environments. Every such cell responds to the stimuli that disturb its sensitivity with some sort of resultant organic activity. This *reflex action* is a common property of all protoplasmic cells.

Biology teaches also that stimulations repeated in sequence at intervals of sufficiently short duration produce reflex cell responses that vary in quantity and quality. The variations produced by such repetitions must be due to continuations of the influence of preceding stimulations. This persistence of the effects of the stimulations of cell sensitivity is of the nature of memory. We have here evidence of protoplasmic memory, or cell memory, described by biologists as organic memory.² These phenomena exhibited by associations of cells such as those formed by the cells of the nervous system and those of the organs of the voluntary muscle systems, constitute associative memory.

Physical education activities exercise the protoplasmic cells of the voluntary muscles and those of the neurone chains that are associated with them as well as of the numerous other associations of cells implicated in physical education activities. These activities lead to the establishment of organic memories and associative memories that govern such skills and techniques of physical

¹For a convincing illustration of influence on growth see "How Animals Develop," by C. H. Waddington, W. W. Norton & Company, 1936, p. 112, fig. 28, "Difference in guts of tadpoles fed (a) mainly on vegetables, (b) exclusively on meat (from Dürken)."

²See "Heredity and Environment in the Development of Men," by Edwin Grant Conklin, Princeton University Press, 1930, pp. 36 et seq. "Germinal Bases of Mind."

¹I am assuming that the autonomic nervous system includes the sympathetic nervous system. Perhaps I should have listed the sympathetic nervous system separately.

education activities as those of the child that has "learned" to use its eyes, its tongue, its arms and legs, its fingers, and that has learned to walk and to run. They are probably fundamental to the skills and techniques of the specialized participant in physical education activities, of whom the athlete is perhaps the most spectacular example.

Cell sensitivity, cell reflexes, cell memory, and associative cell memory, are probably fundamentals of mind. In any event they are essential parts of all physical education activities.

I am interpreting mind as government of behavior. In accord with this interpretation, there are several levels of mind. These levels are actually or potentially present in the living organization of the single protoplasmic cell that, for an hour perhaps, is all there is of a human being at the beginning of his or her life. These levels of government—that is to say, of mind—may be described as (1) physical-chemical; (2) tropic; (3) hormone; (4) nerve reflex; (5) instinct government, and (6) government by intelligent mind. Physical education activities exercise *all these levels of mind*. They exercise all of them automatically and some of them voluntarily. There is reason to believe that they exercise an educative influence on all these levels of government. There can be no question that under favorable leadership physical education activities exercise, and therefore educate, the qualities of intelligent insight mind, reflective mind, and creative mind. These are exercises that when favorable produce, improve, maintain and defend the mental health of the participant.

Thus physical education activities, particularly in the periods of childhood and youth, may lead the individual to form and practice habits of mental hygiene that are characterized by such qualities as self-control, self-respect, satisfaction without regret, joyousness, happiness, and wholesome enthusiasm.

Physical Education Activities as Practices That Construct, and Defend, Wholesome Social Personality. And now let me refer, all too briefly, to the formation and practice of social health habits by the individual through participation in physical education activities—the education of—the production, improvement, maintenance, and defense of—wholesome social personality through favorable participation in social physical education activities.

The life of each one of us begins with a somatic heritage, a mental heritage, and a heritage of multiple personalities present actually and potentially in the single cell that for a time—an hour perhaps—is all there is of any one of us. Under the influence of favorable environment and of favorable behaviors in relation to environment we grow, develop, mature and become multicellular, somatic, mental, and social individuals, educated for good or for evil by the sorts of interactions that characterize our behaviors in relation to our physical, biological, and societal environments. As I understand it, as a product of these behaviors, personality is the

somatic, mental, and social evidence with which one describes and identifies himself to others.

Physical education activities are exercises of multiple personalities. Under favorable leadership and guidance selective habits are formed by the individual that build for him wholesome social personality, that is characterized by fair play, sportsmanlike behavior, unselfishness, respect for the Golden Rule, good taste, cooperation, altruism, and similar qualities of healthful social personality.

Under the wrong sort of leadership vicious personalities are emphasized and educated by participation in physical education activities, made unfavorable by such leadership. The resultant personality product may be a-social or anti-social. Selfishness, greed, cruelty, hatred, are synonymous with "dirty play," unnecessary roughness, dishonorable or dishonest conduct.

There can be no intelligent argument against the contention that favorable physical education activities under prepared competent leadership, particularly during the period of childhood and youth, exercise selectively and therefore educate selectively emergent wholesome social qualities of personality.

"*The Law of Exercise.*" And now may I call your attention to the evidence I have set before you that supports a conception that was current when I was a young man some forty years and more ago. This conception was that there is a biological law of use, a law of exercise. This law, as I see it, is to the effect that favorable biological exercise stimulates an increase in the blood supply and therefore the nutrition of the organs and organ systems involved; promotes their growth, development and maturation within the limits of their biological heritage; perfects their functional competence; and, again within the limits of biological heritage, educates the body, mind, and personality of the human participant.

In further support of the validity of this "law," I need only remind you of what you already know through your own personal observation concerning the effect of deficiencies or deprivations of exercise and concerning the effects of the wrong sorts, qualities and quantities of educative exercise whether such exercise be mainly physiological or mainly psychological or mainly social.

SUMMARY

In conclusion, I urge in review of my paper, first, that every human being is a biological entity constituted by a heritage of an inseparability of body, mind and personality, utterly dependent upon the favor of environment and upon favorable somatic, psychological and social behaviors in relation to environment; second, that physical education activities exercise—*must exercise*—the whole individual, physiologically, psychologically and socially; and third, that under favorable prepared leadership, the individual participant in physical education activities, particularly in the periods of childhood and youth, will form and practice health habits that produce, improve, maintain and defend the somatic, mental, and social qualities of his life.

Gonococcus Cultures as an Aid to Diagnosis*

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SINCE McLeod and his co-workers¹ in 1934 showed that the cultural is superior to the smear method in diagnosing gonorrhea, this method has been gaining popularity; however, it is as yet too infrequently used as shown by a survey conducted by Leahy and Carpenter² in 1936.

The cultural method was first used in our clinic three months ago, and although the clinic is quite small, the method has proved to be of definite value, as can be seen by the following case reports which are typical samples of the 24 positive chronic cases handled.

CASE REPORTS

Case 1. A. N., age 18, male, single, reported to the clinic January 13, 1939, because of an occasional morning drop of pus at the urethral meatus. He had been treated for gonorrhea and discharged as cured one year previously. Examination: There was a slight mucous colorless discharge at the urethral meatus. Smears were made and examined by two laboratories, and were negative for gonococci. The urine test: First glass, fine shred and slight haziness; second glass, clear. Culture of the urethral mucus was positive for gonococci. Routine therapy was instituted and the patient improved.

Case 2. D. R., male, age 22, married, reported to the clinic February 20, 1939, because of a discharge from the urethra for the past three months. This discharge was of intermittent nature, present one day and then absent for a day or two. He had been treated for gonorrhea and pronounced cured a year previous. His wife was being treated at another clinic for trichomonas infection of the vagina and cervix uteri, and would not come in for cultures. Examination: There was a slight grayish white discharge at the urethral meatus, a smear of which showed a few pus cells but no organisms. The urine test: First glass, a few shreds but otherwise clear; second glass, clear. The prostate was enlarged, soft and baggy. A prostatic smear showed many pus cells but no organisms. Culture of the prostatic fluid was positive for gonococci. Routine therapy was instituted and the patient improved.

CULTURE TECHNIC

Because of the fact that the gonococcus is very sensitive to an altered environment, it should be cultured as soon after it is obtained from the patient as possible. The specimen is taken on a sterile swab which is immediately streaked on "chocolate" agar plates. Difco Company,³ with the aid of Carpenter, McLeod and Herrold, has prepared a "chocolate" agar medium which is very satisfactory for culturing gonococci. It is composed of a proteose-peptone no. 3 agar base to which has been added a special dehydrated blood preparation. If the swab must be transported to a laboratory, it is essential that it be placed in a test tube containing 1 cc. of sterile ascitic fluid or a special peptone broth, as proteose-peptone no. 3 broth (Difco Company) to prevent the swab from drying and to keep the organisms viable. Plates should be streaked within two to four hours after obtaining the specimen. The plates are incubated at 36° C. under a 10 per cent carbon dioxide tension.²

Gonococci are readily recognized as small, opalescent,

convex, dew-drop colonies, but in the presence of secondary invaders, they may be obscured from view, in which case the "oxidase" test is used. This test was first described by Gordon and McLeod,⁴ using tetramethyl-paraphenylene-diamine hydrochloride, but as Leahy and Carpenter point out, the dimethyl-paraphenylene-diamine hydrochloride is just as efficient and much less expensive. The test consists of flooding the plates with a 1 per cent aqueous solution of the dye and immediately pouring off the excess dye. Usually within two minutes the gonococcus colonies will turn pink, then maroon and finally black. For subculturing, the colonies should be fished out while they are in the pink stage as they are killed by the time the colonies turn black. The dye has no effect on the Gram stain, which is used to check the oxidase positive colonies, and the oxidase is not specific for the gonococci alone, although it is usually negative for the common secondary invaders of gonorrhea. The gonococcus is differentiated from other members of the genus *Neisseria* by fermentation tests on carbohydrates, the gonococcus being the only species of the genus fermenting glucose alone.

DISCUSSION

In acute cases of gonorrhea we found that the smears were positive as frequently as the cultural growths, but in the chronic cases the cultural was found to be superior to the smear method. In 24 positive chronic cases examined in the past three months, only 14 were found to be positive by the smear method, whereas 23 were positive by the culture method. These negative smear cases would ordinarily have been classified as nonspecific urethritis and would have been epidemiologically as dangerous as the carriers mentioned by Pelouze⁵ in sulfanilamide treated cases.

SUMMARY AND CONCLUSIONS

1. Smears were as effective as cultures in making a diagnosis of acute gonorrhea.
2. Cultures were more efficient in making a diagnosis in cases of chronic gonorrhea.
3. Culture and smear methods used together afford greatest efficiency.
4. All patients, before being discharged as cured, should have negative cultures of their prostatic fluid and urethral mucus.

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Lobectomy and Pneumonectomy for Lung Suppuration and Malignancy

A Comprehensive Analysis Including the Authors' Series

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PART II.

PNEUMONECTOMY

IN 1931 Nissen first successfully removed an entire lung. Till then the records of but six attempts had appeared in the literature: W. Meyer (one in 1909, two in 1923), Kummell (one in 1911) and Lilienthal (two in 1922).

In America the first successful pneumonectomy for bronchiectasis was performed by Haight in 1932. The following year Graham for the first time in surgical history removed an entire lung for carcinoma with recovery of the patient. In April 1934 when Haight's report appeared in the literature, such was the impetus furnished by these four successes within two years, that the author in an addendum gave brief data concerning ten other total lung removals by as many surgeons. It will be of particular interest to consider the technical development of this surgical undertaking and the successes that have occurred.

PNEUMONECTOMY FOR BRONCHIECTASIS

Identical diagnostic and preoperative precautions are observed before pneumonectomy as for lobectomy. By thorough lipiodol injections, it must be shown that the contralateral lung shows no evidence of bronchial deformities. By repeated bronchoscopies the X-ray findings are corroborated, and by frequent aspiration of the pus from the affected lung the general condition of the patient improved. We now feel it particularly advisable to bronchoscope these patients immediately preceding operation that contralateral lung soiling may be minimized.

CARE OF PLEURAL SPACE

A problem of vital importance is the care of the parietal pleural space after total lung removal. Despite every precaution taken as the bronchi are divided and while the stump is being closed, some pleural soiling usually occurs. Moreover, because as a rule the structures are intimately matted together by virtue of the long-standing inflammation, it is often not possible to bury the divided bronchus sufficiently well so that post-operative leakage from it is prevented. The resultant empyema that follows contamination of this space, if it does not overwhelm the patient, often necessitates thoracoplasty to arrest it. For these reasons it has seemed advisable to the authors to minimize the size of this pleural space by thoracoplasty before pneumonectomy for bronchiectasis, not carcinoma, rather than be called upon to do it under more adverse conditions after lung excision. At the same time the pulmonary apex is freed from the

subclavians and the great vessels above the hilum that the subsequent lung removal may be facilitated. Exposure of the lung when it is to be removed is surprisingly improved. The hilum because of the collapse of the chest wall is close to the surface.

In Table II there are recorded nine cases in which thoracoplasty preceded pneumonectomy. While there were three deaths in this group, none of them was due to complications occurring within the affected side. All fatalities from empyema were among those cases in which no preoperative provision had been made to minimize the space in which septic pleuritis was likely to develop. Eleven per cent of the patients without preliminary thoracoplasty died of empyema. Thirty-one per cent of the total deaths were from empyema. Of the patients without preliminary thoracoplasty, five, or 14 per cent, eventually required thoracoplasty to obliterate chronic empyemal cavities. Even when in the end the pleural space is obliterated by marked displacement of the surrounding structures, it would seem more than likely that the mediastinal distortion of the organs within would probably lead sooner or later to disabling complications as is frequently the case in chronic fibroid tuberculosis (Graham). Even though this preliminary thoracoplastic procedure in a particular patient appears a hazardous one because of the probable virulence of the infection within his lung, yet were he subjected to pneumonectomy without it, the probability would be even greater that overwhelming septic pleuritis would develop.

CHEST WALL INCISIONS

It seemed most convenient to give detailed consideration of the various chest wall approaches in connection with the surgical treatment of carcinoma. It will be discussed at that time under "Modern Technic." However, since preliminary thoracoplasty is not performed except when extensive lung suppuration exists, it is desirable that the operative incision for pneumonectomy following it be elaborated here. Because following thoracoplasty the chest wall closely approximates and nearly parallels the mediastinum with only the extensively collapsed lung between, an incision from the fourth rib near the spine downward and outward along a line corresponding to the fifth interspace to the parasternal region is no more extensive than a posterolateral one along a normal chest wall. The absence of ribs renders exposure excellent to a lung and hilum that have been largely superficialized by the preliminary multiple rib removals. The surgeon by virtue of this nearly bisecting incision is enabled to obtain wide exposure both anteriorly and posteriorly so that he can deal most ad-

TABLE II
Pneumonectomy for Bronchiectasis

Surgeons	No. Cases	No. Oper. Stages	Cured	Im- proved	Oper- ative Deaths	Prelim- inary Thoraco.	Persis- tent Sinus	Closed	External Drain	Postop- erative Thoraco.
Alexander	2	1	1		1	2	1	1	2	
Arce	3		1	2			2	1	3	
Archibald	1	1			1	1			1	
Beye	1					1	1		1	
Burnett	1			1			1		1	
Churchill	2	1-2	1		1		1		2	
Crafoord	1	1			1		1			
Dewey	1	1			1				1	
Dolley and Jones	3	1			3	1			3	
Edwards	8	1	5	1	2		1	5	7	1
Gale, Keeley, Coon	1	1	1			1		1	1	
Graham	2	not stated	2			not stated		2	2	
Haight	1	2	1			1		1	1	
Holst	1	1		1			1		1	1
Lilienthal	2	1			2				2	
Lindskog	1	1		1			1		1	1
Mason	6	1	2	2	2		2		6	2
Nissen	1	2	1			1		1	1	
Overholt	2	1	1		1		1	1	2	
Rienhoff	2	1			2				0	
Roberts	1	1	1					1	1	
Walker	2	1	1	1				2	2	
Windsberg	1	1		1		1	1		1	
23	46	36-1 3-2	18	10	17 = 37%	9	14	16	42	5

vantageously with whatever widespread adhesions may be found.

DISPOSAL OF THE STUMP

Because of inflammatory reaction at the hilum, it is seldom safe or possible to ligate separately without tourniquet the vessels and bronchi. The treatment given the lung root is described in detail under lobectomy. Often separate treatment of each lobe proves more practical. When the entire hilum can be isolated without danger, the tourniquet can be closed about it and the entire lung stump closed simultaneously. It is of interest to note that in both Nissen's and Haight's cases the lobes were ligated separately and the lobes, deprived of their blood

supply, were left to slough off. There were no untoward complications. Since those initial cases, however, it has become the universal custom to excise the lobes at once.

MICELLANEOUS CONSIDERATIONS OF TABLES II AND III

Not including Nissen's (one) and Haight's (one) cases, all pneumonectomies have been completed in one stage except one (Churchill). The large percentage of persistent fistulae (48 per cent) is due in a very considerable measure to the presence of empyemal cavities that can be naturally reduced only by the encroachment into the affected hemithorax by mediastinum, chest wall and diaphragm, since no lung remains that by reëxpan-

sion would aid. Many of these cases will require thoracoplasty to produce closure. When the residual empyema cavity is reduced to a narrow cleft, the bronchial fistula almost without exception closes spontaneously. With the exception of Rienhoff's cases (two) and one of Edwards's, all were drained. While the various operators almost unanimously have accepted Rienhoff's opinion that clean or reasonably clean cases are advantageously closed without drainage, it is apparent from the figures (42 out of 45 cases reported) that in these extensively infected fields drainage is less hazardous.

TABLE III
Causes of Death After Pneumonectomy for Bronchiectasis

Postoperative hemorrhage	1	Cardiac failure	1
Sup. bronchopneumonia	3	Spon. pneumo. other side	1
Empyema	6	Pul. emboli	2
Pul. edema	1	Shock	2

A brief consideration of the causes of death is of value (Table III). Empyema has been already discussed. In our own cases in this group, we were particularly unfortunate. A child of five years withstood the operative procedure almost without change in pulse or respiration, yet five minutes after the completion of the operation, left alone by the nurses for not longer than two minutes, she was found dead: spontaneous pneumothorax on the contralateral side. The remaining two suffered multiple septic emboli to the remaining lung and were soon overwhelmed.

In a careful analysis of the fatalities suffered by the other surgeons, we found that their fatalities do not differ greatly from those of which we are apprehensive in connection with any operative procedure of magnitude. While the mortality in this particular group is 37 per cent, there is every reason to believe that in the next 45 cases reported it will be very encouragingly reduced. While pneumonectomy for bronchiectasis is still a formidable procedure, yet with 60 per cent cured or greatly improved it seems preferable to the forlorn existence that faces a person with lung suppuration so extensive that total lung removal remains his sole hope for recovery.

PNEUMONECTOMY FOR CARCINOMA

There seems every reason to believe that carcinoma of the lung has materially increased in frequency during the past ten years. Weller compiled the statistics of autopsy reports from 26 clinics to obtain a combined average of 5 per cent of lung carcinomas among all carcinomas up to 1927, covering a period of several decades. Junghaus, limiting his autopsy studies to the last ten years of this period, obtained an average primary lung involvement of 9 per cent of all cancers. Jaffe concluded from a study of available recent statistics that 11+ per cent of all cancers are bronchogenic and are next in frequency to the stomach and intestine. No convincing evidence is at hand as to causative factors for this alarming increase. For several years we have expressed the opinion that this increase has been roughly synchronous with that of motor vehicles and that therefore the constant inhalation of exhaust fumes could be responsible. Ochsner suggested the inhalation of tobacco smoke as likely to be a frequent causative agent, yet

Hoffman "was unable to find a single case that was attributable to nicotine," in a careful analysis of the records published by the Census Office of the United States.

In Table V there are recorded four cases of sarcoma of the lung. Fried, whose conclusions concerning lung malignancy have been widely accepted, expressed the opinion that usually the so-called lung sarcoma was actually an "oat-celled" carcinoma. It is his opinion that all pulmonary carcinomas are bronchial in derivation, originating from the basement cells of the bronchial mucosa. Since these cells are undifferentiated, the neoplasm itself may be composed of undifferentiated cells or may assume either oat-celled, adenomatous or squamous-celled characteristics. Actually two or even more of these cellular structures are not uncommonly found in the same tumor. It is therefore not unlikely that those growths reported as sarcomas would be included among carcinomas by Fried. They will be so considered in this review.

The discussion of bronchial adenomas has been accorded an increasingly prominent position among lung neoplasms in the recent literature. They comprise about 6 per cent of intrabronchial bronchial growths of which the remaining 94 per cent are carcinomas (Kramer & Som). Their histological structure is varied and because often microscopically they are exceedingly difficult or perhaps impossible to differentiate clearly from adenocarcinomas, a certain number doubtless were reported to the surgeons as malignant. Some were cured by endobronchial extirpation with or without local radium application, others by lobe or lung removal, while still others finally succumbed to extensive lung suppuration secondary to complete bronchial obstruction by the growth itself which to the end remained benign. It is therefore more than probable that among the adenocarcinomas included in Table V there were adenomatous neoplasms, microscopically malignant though clinically benign.

Since surgical extirpation of bronchogenic carcinoma is vitally dependent upon early diagnosis, it seems particularly advisable in this report to state briefly the four most frequent complaint groups, any one of which made to the general practitioner should lead him to suspect an intrabronchial neoplasm.

Symptoms due to pressure upon diaphragm or intercostal nerves:

(1) Upper abdominal or lower thoracic discomfort with gradually increasing malaise. Often lower lobe abnormalities are immediately evident under the fluoroscope.

Symptoms due to vagal terminal irritation:

(2) Persistent dry cough that has not responded to the usual remedies.

Symptoms due to bronchial obstruction:

(3) Acute severe onset closely resembling influenza with bronchopneumonia that pursues an atypical course leading to a protracted convalescence.

(4) Lung abscess.

Since the symptoms depend entirely upon the location of the neoplasm which even at autopsy may be no larger than a walnut, there will always be an unfortunately

large percentage of patients that will have no discomforts of sufficient severity to direct them to a physician until untoward extension or metastasis has occurred. If a vagal terminal be not involved, not even cough would develop. If the growth were primarily intramural, it might enlarge preponderatingly into the surrounding parenchyma and not produce obstructive signs until inoperable. The fate of the host, therefore, depends largely upon the location of this most unwelcome guest and the diagnostic acumen of the physician whom he first consults.

DIAGNOSTIC METHODS

When any one or more of the symptoms mentioned above exists, some of the following procedures are clearly and immediately advisable:

(1) Bronchoscopy. Seventy-five per cent of bronchogenic carcinomas are situated in the main stem bronchi or at the beginning of a secondary bronchus and are bronchoscopically visible. (Jackson & Konzilman, Kramer & Som).

(2) Frequent examination of the sputum for "malignant cells" by the "wet-film" method of Dudgeon. He claims positive findings in 60 per cent of proven cases.

(3) Diagnostic pneumothorax followed by visualization of the lung by thoracoscope. Matson et al were able in 27 cases of proved carcinoma not only to see the growth itself but to ascertain in relation to the mediastinum whether or not the lung involved was surgically removable. If a pleural effusion is present following aspiration of the fluid, thoroscopic examination will usually reveal pleural involvement if it be present. All the aspirated fluid should, of course, be sent at once to the laboratory where according to the method of Mandelbaum, the solid materials are thrown down by centrifuge. The resultant "button" is hardened, sectioned and stained for malignant cells. If the fluid proved to be bloody, it would be necessary to mix it with citrate solution as it is being withdrawn in order to prevent clot formation that would prevent recognition of the malignant cells themselves. Their presence would preclude operation. By recourse to one or all of these methods more than 90 per cent of lung carcinomas can be diagnosed.

Needle aspiration biopsies, in the writers' opinion, are not to be commended when the possibility of surgical cure exists. Recently a patient was referred to us for surgical consideration who had had bloody pleural fluid aspirated which by the "button method" showed malignant cells. A tumefaction in the subcutaneous tissues at the site of the needle tract was biopsied and was found to be carcinomatous. Manifestly it developed from needle contamination. The three methods above mentioned almost invariably (90+ per cent) will afford as much information to the surgeon as this considerably more hazardous "needle biopsy."

OPERABILITY

Contraindications:

(1) A carcinoma proved by biopsy that involves the bifurcation of the trachea.

(2) A mass as shown by thoracoscopy that extends into the mediastinum.

(3) Pleural fluid that by "button" contains malignant cells.

(4) Marked loss of weight that cannot be explained by an existing inflammatory process.

(5) Any evidence of metastasis, i. e., brain, mediastinum, abdomen, lymph nodes, long bones or chest wall.

(6) Renal disease. Well-established cardiovascular disease.

If none of these contraindications exists, exploratory thoracotomy is clearly indicated with complete lung removal, provided the mediastinal structures show no evidence of involvement. There is no incontrovertible proof that cancer of the lung has been cured in any way other than by surgical extirpation.

PREOPERATIVE PREPARATIONS

It is seldom that there are real contraindications to the establishment of pneumothorax preliminary to pneumonectomy for carcinoma. While its institution has not yet become universal, its advantages both in thoroscopic diagnosis and in preparing the patient for the atmospheric pressure conditions when his chest is abruptly laid open is being rapidly more appreciated.

If lung suppuration exists, preliminary bronchoscopies as recommended under lobectomy may seem advisable.

Rienhoff claims the preoperative production of an acute nonbacterial pleuritis by the intrapleural introduction of beef broth greatly facilitates the control of an infection that might otherwise prove serious following soiling of the pleural space as an inflamed bronchus is divided. Arce's experience seems to bear this out. In his three pneumonectomies for suppurative conditions, he filled the pleural space with gauze, leaving it in place for fifteen days, and did not suture his chest wall incision. Not only did his patients all survive but the pleural surfaces were covered with healthy granulations when the gauze was removed.

Even when extensive suppuration coexists with the carcinoma it is inadvisable to perform a preliminary thoracoplasty. As will be discussed later, serial dissection of the lung hilum is essential. It is more than likely that thoracoplasty would increase the hilar edema, materially adding to the difficulties that are encountered when inflammation has involved these structures. It seems preferable to risk extensive infection of the pleura than to leave lung tissue by mass ligation that probably is already involved by reason of its lymphatics.

The criteria considered in the choice and methods of anesthesia are surveyed under lobectomy and are not different from those in connection with carcinoma.

TREATMENT

I. Historical.

It is of more than passing interest to recall the developmental variations in technique of the first three successful pneumonectomies for carcinoma beginning with Graham and Singer's in 1933. Through a posterolateral incision they tied a small rubber catheter tightly around the hilum and just distal to this applied crush-

ing clamps; then the lung was removed with an electric cautery knife. By means of two transfixing double ligatures of a No. 2 chromic, one distal to the catheter and another cephalad to it, hemostasis was accomplished. Because it was felt that the space left after the removal of the lung must be obliterated, an extensive thoracoplasty was done after lung removal, the first and second ribs being left intact for a second procedure when the patient's general condition had improved. In Rienhoff's report of the following year, the approach in his two cases was anterior through the third interspace, and after lung removal the chest wall was closed tightly without rib resection. Vessels were individually ligated, the divided bronchus was closed with silk and buried in the stump. He felt that the anterior approach made the vessels in the hilum much more accessible when separate ligation of them was contemplated. Edwards in 1934 adopted the posterolateral approach, and though his care of the lung hilum was not reported in detail he stated that it seemed likely when separate ligation of the various structures was to be done that the anterior approach might be preferable.

Lobectomy for carcinoma is mentioned only to condemn it. Since its rise and fall occurred early in the surgical treatment of pulmonary cancer, it is best considered here. Carlson and Ballou collected 25 lobectomies for malignancy to 1935 (Graham, Singer and Ballou, p. 834). Despite the fact that the last four years have been the most prolific ones in lung surgery but five additional cases have been reported, directly or indirectly, subsequent to 1935. Five others (Neuhof's) not included in Carlson and Ballou's series were performed in 1934 or earlier.

In Table IV it is shown that of the 35 cases, 29 were dead when reported. Of the six reported still alive, three were less than three months postoperative. Fifty per cent of the total and sixty per cent of the deaths were from recurrence or metastases. Since all of the remaining recorded deaths occurred within a few days following operation, it is logical to presume had they survived their immediate postoperative complications a similarly large percentage in addition to those mentioned would eventually have died of metastases.

A partial removal of an organ is no more applicable to the lung than to any other organ, stomach, uterus, breast or thyroid, for example. Nor should total removal be performed without the excision of regional lymph nodes. Bonniot, Monod and Evgard after careful dissection of 200 lungs obtained at autopsy, found that not only is collateral circulation between lobes frequent but that arteries to the lower are not rarely given off above those to the middle lobe. Furthermore, serial dissection of a lobe root without leaving pulmonary tissue that is likely to be already involved is seldom possible. The technically safe application of a tourniquet before lobe removal usually precludes the possibility of removing the bronchus well above the neoplasm. Lobectomy for carcinoma is unsurgical; pneumonectomy should supplant it.

II. Modern Technic.

The collaborated experiences of the various surgeons

TABLE IV
Lobectomy for Carcinoma

Surgeon	No. Cases	Dead	Alive	Cause of Death
Allen and Smith	1		1	
Archibald	1	1		Septicemia
Brunn	2	2	cautery	Spon.pneumothorax
Churchill	2	1	1	Bronchopneumonia
Dolley and Jones	1	1		Metastasis
Edwards	1		1	
Eloesser	1	1		Hemorrhage
Graham	7	7	cautery	Metastases 3
Harrington	3	3		Recurrence 2 Embolism 1
Janes	1	1		Metastasis
Key	2	2		Recurrence Metastasis
Lilienthal	1	1		Bronchopneumonia
Mirizzi	1	1		Empyema
Neuhof	5	5		Metastases
Nissen	1	1		Recurrence
Rist, Monod and Jacquet	1	1		Metastases
Sauerbruch	2		2	
Sato	1	1		Recurrence
Walzel	1		1	
19	35	29	6	

have evolved a surgical treatment that except for minor variations is generally followed today.

Chest Wall Approach:

(1) Anterolateral incision begins along the third interspace with division of adjoining ribs or cartilages with or without resection of a rib (Rienhoff), or by a curved incision beginning at the second costal cartilage downward to the sixth and out along the fifth interspace beyond the anterior axillary line. Here the second to the fifth cartilages, inclusive, are divided with removal of short sections to prevent ends rubbing together following operation. The incision is carried through the fifth interspace without rib removal. (Overholt).

(2) Posterolateral incision begins about the level of the fourth rib lateral to the spine and is carried downward and forward along the fifth interspace to the anterior axillary line. (Graham, Edwards, et al.)

(3) Combined anterior and posterior approach extends from spine to sternum along the fifth interspace with or without removal of the rib. (Crafoord).

If the lung is widely adherent posteriorly, posterolateral exposure is required. When separate ligation of vessels and of bronchus is contemplated, the anterolateral approach renders these structures much more accessible. In the event adequate exposure both anteriorly and posteriorly is desirable, the combined incision of Crafoord is most satisfactory.

CARE OF THE HILUM

Mass ligation of the stump is very likely to leave some carcinomatous tissue either in the stump itself or just at the mediastinum, nor does it permit removal of lymph nodes in the hilum and the immediately adjacent mediastinum. Isolation and separate ligation of each vessel and of the main stem bronchus without tourniquet has become the accepted procedure as first described by Rienhoff. The vessels one after another are exposed, dissected out, doubly ligated and divided, until the main bronchus alone remains. The bronchus is freed from surrounding structures to within two centimeters or less of its union with the contralateral bronchus. It is then divided, carefully closed with silk, and buried in the vascular tissues surrounding it. By this technique both vessels and bronchus contract into the mediastinum. No stump whatever remains. Lymph nodes in the neighborhood within the mediastinum are dissected out. The mediastinal pleura is easily closed by running suture, leaving only a single narrow suture line to indicate that formerly a lung occupied this hemithorax.

The technic in the closure of the bronchus itself varies considerably with the different men. Crafoord divides the bronchus obliquely and by a series of mattress sutures draws the membranous portion of the bronchus tightly up to the cartilaginous rings. He strengthens this closure with a double row of mattress sutures between the two cartilages immediately proximal to this stump. Rienhoff's procedure is a similar one except that he removes the cartilaginous ring at the stump and buries the divided ends by a purse string suture. And by still others a continuous running closure is made with two or more purse strings in the surrounding soft tissues of the hilum. Gradually by a series of circular sutures the bronchus is buried a distance of one to two centimeters from the mediastinal pleura which is closed tightly over the divided structures. Almost without exception silk is the material used for bronchial stump closure that absorption of the suture material may offer the greatest resistance to premature separation of the walls of the bronchial stump.

From the beginning of the operation to its completion every possible precaution is taken to prevent infection of the large pleural cavity that will remain following lung removal. Soft tissue wound edges are protected with gauze saturated in some antiseptic solution. After the division of the vessels, the bronchus only remains for treatment. Wet packs are placed to isolate this region. After the bronchus is closed and well buried in the surrounding soft tissues and the mediastinal pleura has been loosely approximated with a running suture, the hemithorax is thoroughly rinsed out with warm saline solution and the chest wall is closed tight without drain-

age. Edwards inserts an intercostal drain under airtight conditions and establishes suction. This drain is removed in twenty-four hours. He feels that it materially aids by the negative pressure produced in the early establishment of progressive reduction in the size of this pleural space.

While a few cases have had this space reduced by thoracoplasty, it has become almost a universal custom now to leave the chest wall intact. When the space left rapidly becomes filled with serum, it has been found that unless an infection developing within it makes external drainage mandatory, thoracoplasty seldom becomes necessary. This dead space gradually becomes satisfied. Three factors are apparently responsible:

(1) Negative pressure synchronous with the absorption of the air trapped within it, pulls the diaphragm up, narrows the intercostal spaces. Scoliosis develops with its convexity toward the operated side. The cupola of the chest drops and the mediastinum is displaced to that side.

(2) There is prompt enlargement of the remaining lung so that it actually bulges into the operated side independently, it seems, of the negative pressure above described. Rienhoff, based upon the study of cases of congenital absence of one lung and of pneumonectomized patients who came to autopsy, is convinced that this is largely due to actual compensatory dilatation of the respiratory units without injury to the elastic tissue in contradistinction to emphysema where the elastic tissue is torn and fragmented. Behrend and Mann are of the opinion that this compensatory enlargement of the opposite lung is due to the utilization of a variable number of usually superfluous respiratory units that are present and inactive in the lung under normal conditions and are only called upon for service when anoxic conditions develop.

(3) Serum pouring into this pleural space because of the trauma following surgery and the negative pressure developing during the air absorption coagulates and by its continued presence serves as a scaffolding for fibroblasts which finally by the production of fibrous tissue contract and add their influence to the obliteration of this space and its stabilization.

It is self-evidently advantageous, moreover, that the integrity of the chest wall be maintained during the immediate postoperative days that the cough reflex of the remaining lung be sustained at maximum efficiency. For the same reason it is felt unwise to paralyze the diaphragm during this period. Its piston-like action, even on the side deprived of its lung, probably aids in the eliminative facility of the lung on the contralateral side.

POSTOPERATIVE CARE

Unless gross soiling of the pleural cavity takes place and suppurative pleuritis seems almost inevitable because of parietal pleural injuries incidental to division of adhesions, the chest wall usually is closed tight without drainage. Edwards's custom of suction drainage for the first twenty-four hours, however, seems rational and advantageous, and is likely to be widely adopted. The first two days following operation are anxious ones particularly because of the possibility of bronchial open-

TABLE V
Pneumonectomy for Carcinoma

SURGEON	No. Cases	Care of Hilum		CAUSE OF DEATH												Alive		
		Ligation		Empy-ema	Hem.	Bron. Pneu.	Card. Fail.	Metas-tases	Atelec	Lung abs.	Emb.	Asphy.	Peri-tonitis	Urem.	Emph. Media.			
		Mass	Serial															
Adams	2		2															2
Alexander	4	2	2			1	1											2
Arce	2		tam-pon-ade				1											
Archibald	2	2					1	1										
Bigger	1		1			1												
Churchill	1	*						1										
Crafoord	12		12	2	1	1	1		2	1	2							3
Dolley and Jones	2		2															2
Duval and Monod	1							1										
Edwards	13	2		1			1											4
Flick and Gibbon	1		1					1										
Freedlander	5	2	3	3				1										1
Frissel and Knox	1							1										
Graham and Singer	1	1																1
Graham	3					2		1										
Haight	3		3				1											2
Hintz	1		1														1	
Holst	1				1													
Ivanissovich and Ferrari	1		1				1											
Kummell	1	1						1										
Lambret	1		1		1													
Lilienthal	1	1				1												
Lyle	1		1															1
W. Meyer	1	1					1											
Matson et al	1	1		1														
Ochsner and De Bakey	9		9		1		2					1	1	1				3
Overholt	11	5	1		2	1												8
Rienhoff	7		7					3										4
Santy	1	1					1											
29	91	19	47															33= 36%

*Tourniquet mattress suture

ing. If the patient develops an harassing cough it pre-
sages an opening bronchus. Pleural contents entering it
produce an immediate and violent spasm of coughing.
Expectoration of thin fluid makes the fear a certainty.
Fluid present should at once be drained that a sudden
increase in the flow of serum from the pleural space may
not result in drowning. If a fistula occurs, infection is
almost sure to develop. Postponement of external drain-
age is of little avail and may be disastrous. If it does
become necessary, constant suction should be maintained.
If during the subsequent few weeks steady reduction in
the size of the infected pleural cavity has not occurred,
much time and discomfort can be spared the patient by
collapsing the chest wall by thoracoplasty.

Other factors in postoperative treatment have been
discussed under Pneumonectomy for Bronchiectasis.

In Table V there is presented a total of 91 cases
collected from the literature. Of this number, 33, or
36 per cent, were alive when reported. A study of the
causes of death is of value (Table VI). Eighteen per
cent of those who died succumbed to metastases, in
marked contrast to 60 per cent who died from meta-
stases following lobectomy (Table IV). Ten per cent
died of hemorrhage following pneumonectomy and an
approximately equal proportion of inflammatory involve-
ment of the remaining lung and cardiac complications.
It seems more than probable that as we achieve stand-
ardization of both preoperative and postoperative pre-
cautions and sure operative technique, these disastrous
complications will be materially lessened. The frequency
of embolism, as Crafoord stated, will probably be re-
duced as we tie the vessels close within the mediastinum.
Atelectasis will be minimized by both constant attention
to the precautions that help prevent its occurrence and
by instant recognition of its presence. Painstaking care
of the hilar stump while treating the bronchus will re-
duce overwhelming empyema. Immediate drainage with
constant suction in conjunction with early recognition of
pleural infection will surely lower empyema's 11 per
cent toll. And finally, the end results in the disposal
of the stump is important. Of the 18 patients who were
reported as having mass ligation 62 per cent are dead,
while of the 38 whose pulmonary roots were disposed
of structure by structure 60 per cent died. Condemna-
tion of mass ligation then would seem to have little
foundation as considered in the light of postoperative
facts, yet reference to Table VII strikingly shows that
of the 13 patients who are alive more than two years
following pneumonectomy and are apparently free of

TABLE VII
Well After Two Years Following Pneumonectomy
for Malignancy

	Date Operated	Elapsed Time to March 1939	Ligation	
			Mass	Serial
Graham and Singer	4- 5-33	6 yrs.	1	
Rienhoff	7-24-33	5 yrs. 8 mo.		1
Overholt	11-13-33	5 yrs. 4 mo.	1	
Overholt	5- 2-34	4 yrs. 10 mo.	1	
Lyle	2-20-35	4 yrs. 1 mo.		1
Overholt	4- 8-35	3 yrs. 11 mo.		1
Haight	6-15-35	3 yrs. 9 mo.		1
Ochsner and De Bakey	4-15-36	2 yrs. 11 mo.		1
Crafoord	4-21-36	2 yrs. 11 mo.		1
Freedlander	4-19-36	2 yrs. 7 mo.		1
Alexander	9-15-36	2 yrs. 6 mo.		1
Dolley and Jones	1-16-37	2 yrs. 2 mo.		1
Adams	1-29-37	2 yrs. 1 mo.		1
11		13	3	10

carcinomatous involvement, 10, or 77 per cent, had in-
dividual ligation of the hilar structures.

LOBECTOMY AND PNEUMONECTOMY FOR
PULMONARY TUBERCULOSIS

It has been universally held that a tuberculous lung
should not be surgically invaded. Yet despite the various
procedures that have accomplished collapse of and pres-
sure against a tuberculous lung, a certain number of
patients persistently possess positive sputum. Among
these who have either submitted to all other radical sur-
gical expedients or in whom these have been considered
contraindicated, there exists a small proportion for
whom lobe or lung removal is indicated and advisable.

The criteria, any one of which may justify a physi-
cian to advise lobe or lung extirpation of his patient, are
the following, provided there is evidence of reasonable
resistance to the disease and the patient's general con-
dition is comparatively good:

(1) Where partial or complete lung removal
offers the patient his only chance of recovery.

(2) Where there are frequently recurring alarm-
ing hemorrhages originating in stiff-walled areas of
rarefaction. If pneumothorax proves unsuccessful,
it is the safer course occasionally to remove the lobe
involved rather than to hazard thoracoplasty. This
is indicated only in those cases where there exists a
strong probability that the lung surrounding the
area in which bleeding takes place is so firm that

TABLE VI
Causes of Death After Pneumonectomy for Carcinoma

	No. Cases	Percentage of Total Cases	Percentage of Deaths
Metastasis	11	12	18
Hemorrhage	6	7	10
Bronchopneumonia	7	8	11
Cardiac failure	11	11	16
Empyema	7	8	11
Atelectasis	2	2	3
Embolism	2	2	3
Lung abscess	1	1	2
Asphyxia	1	1	2
Peritonitis	1	1	2
Uremia	1	1	2
Empysema mediastinum	1	1	2

TABLE VIII
Lobectomy and Pneumonectomy for Tuberculosis

Surgeon	Total Cases	Pneumonectomy	Lobectomy	Arrested	Improved	Dead	Ligation		Draining Sinus	Cause of Death
							Mass	Indiv.		
Arce	1	1			1		1		1	
Beye	2	1	1	1	1		1	1	1	
Crafoord	3	3		3			1	2	0	
Edwards	1		1			1	1			T.B. opposite lung
Eloesser	1		1			1	1			Spread T.B.
Freedlander	1	1			1		1		1	
Graham	2		2	1	1		2		1	
Janes	2		2		1	1	2		1	Hemorrhage from internal mammary
Jones and Dolley	5	3	2	3	2		4	1	2	
Lindskog	1	1			1			1	1	
O'Brien	1		1			1	1			Spread T.B.
Rienhoff	2	2			1	1		2		T.B. other lung
	22	12	10	8	9	5	15	7 of 12 pneumonectomies	8	Spread of T.B. in all but 1 death

chest wall collapse would influence little the danger zone itself. Not only might a sudden exsanguinating hemorrhage occur but infected blood contaminating the bronchi in other lobes allowed to remain because excessively painful postoperative cough precludes its extrusion, would produce a widespread and overwhelming tuberculous bronchopneumonia.

(3) Extensive bronchiectasis complicating tuberculosis. Neither pneumothorax nor thoracoplasty can eradicate this suppurative condition. The therapeutic problem resolves itself into treatment of bronchiectasis that is complicated by tuberculosis. Collapse of such a lung but squeezes the suppurating bronchi toward the mediastinum and in no wise lessens the puddling within them. Lobectomy or pneumonectomy is surely the procedure of choice.

(4) Occasionally despite an extensive thoracoplasty that has perhaps been revised, a slit-like cavity persists. Pleurolysis (Matson) or local gauze compression (Kinsella) has not been considered indicated or has proved unsuccessful. Actual lobe removal then remains the only apparent recourse.

(5) Finally, lower lobe involvement with the tuberculous disease displaced by thoracoplasty into the cardiophrenic angle. Here too only lobectomy offers a chance for cure.

Table VIII represents all the instances of lobectomy and pneumonectomy for tuberculosis that could be found in the literature. In some instances where the outcome

was fatal, the contributors frankly stated that a thoracoplasty would have been preferable. Twelve total and ten partial lung excisions are reported. Of these twenty-two, there are eight whose tuberculous disease was arrested. Since all other medical and surgical expedients had proved unavailing, they seemed by their complete disability to be permanently ostracized from society; yet by lung removal 36 per cent were enabled to return with safety to their homes. Lung removal, it is true, should not be seriously considered if some other procedure offers a reasonable assurance of success. Of the deaths, four of the five were because of postoperative spread of the disease. This complication is manifestly the most to be feared.

LOBECTOMY AND PNEUMONECTOMY FOR PULMONARY CYSTIC DISEASE

The etiological factors concerned in the development of lung cysts are of interest but their consideration is not within the province of this paper. Nor can the various and often complicated conservative attempts to alleviate the patients suffering from this affection and its complications be discussed. In differential diagnosis it is important to realize that sudden dyspnea with clinical and X-ray evidence of a spontaneous pneumothorax, particularly in children, may actually be due to a congenital cyst that because of suddenly developing one-way valve action in the bronchus communicating with it may, by permitting air to enter it with inspiration and largely preventing its exit on expiration, pro-

TABLE IX
Cystic Disease of the Lung

Surgeon	Lobectomy	Pneumonectomy	Alive
Arce		1	1
Churchill	3		3
Eloesser	1		1
Graham	1		1
Lilienthal	1		0
Roberts		1	1
Sauerbruch	4		3
Sellors	1		1
	11	2	11

duce a rapid and enormous enlargement of this cyst at the expense not only of the homolateral lung but the contralateral one as well.

Infection, however, is the factor that regularly arranges the debut of a cystic lung into medical society. Then pneumonia, lung abscess, bronchiectasis or empyema often provides the habiliment that for a time effectually cloaks the real occupant within. In all cases collected from the literature lung removal was necessitated because of infection. It is interesting in referring to Table IX to notice that of the eleven lobectomies there were but two deaths, and that both of the patients subjected to total lung removal survived and are well.

SUMMARY

This comprehensive and critical review of the past and present status of lobectomy and pneumonectomy in the surgical treatment of pulmonary disease is in nowise defensive in character. Obviously, in all the pathological conditions herein considered, the opportunity to regain health depended entirely upon the complete removal of the lung or portion of lung involved. No alternative was apparent.

Mortality rates are steadily decreasing. Complete cures are as definitely increasing. As surgical experiences mount in this particular field, there is every reason to believe that these trends will be sustained.

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Male Hormone Therapy of Prostatic Hypertrophy

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THE treatment of prostatic obstruction has changed radically in the past decade. Up to about twelve years ago, the hypertrophied prostate was removed either by the perineal or suprapubic route. Stricture or bar formation at the bladder neck was either "punched out" by Young's instrument or excised through a cystotomy exposure; neither of these methods was really satisfactory. In 1929 T. M. Davis' procedure of removing large portions of encroaching prostatic tissue through a transurethral instrument, employing the surgical diathermy current for cutting and coagulation of bleeding points, revolutionized the treatment of prostatism. The Stern-McCarthy resectoscope, an improvement upon Stern's original instrument, in skilled hands is a most useful operation. Some urologists exclusively utilize this instrumental procedure and no longer resort to prostatectomy. It is still a good axiom, however, to perform that type of operation which will give the patient the best functional result. Any surgical procedure always carries with it a certain risk.

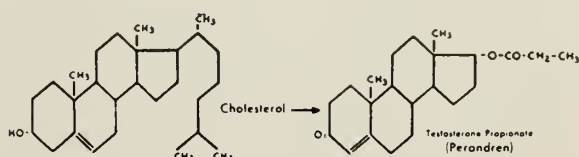
To obviate this risk, Lower and McCullough in 1932 became interested in the hypothesis that glandular imbalance may be the cause of prostatic hypertrophy and that a nonsurgical type of treatment, entirely free of hazard, would be a boon to those suffering from hypertrophy of the prostate. Thus, for the second time in the past decade, something new is presented for the treatment of early and advanced prostatism. Encouraging results from the use of male hormone are appearing in the literature. The writer became interested in hormonal treatment especially because of its possibilities for the great number of patients who are poor surgical risks because of advanced degenerative changes in the cardiovascular-renal systems, coronary disease, diabetes, liver cirrhosis, asthenia and senile debility. There are also good risk patients, who are either afraid of any type of surgery or will not submit to any operation for business or economic reasons.

Personal experience with a series of cases leads me to concur with others that male hormone therapy avoids operation in many cases. Hormone therapy is, of course, not a panacea. Relief of symptoms is not effected in all types of cases. The best results are obtained in the large lobe prostatic hypertrophy. Hormone therapy tends to arrest prostatic hyperplasia and is recommended for early prostatism. Accumulating experience will eventually determine whether the good results will be lasting. At the moment, hormonal therapy is well worth a trial for the relief of the distressing symptoms of prostatism.

Hormonal treatment is not really a new idea. It was employed empirically many years ago, because of the observation that eunuchs and postoperative castrates were not affected with prostatic enlargement. This clinical observation led some surgeons to advocate orchidectomy

or ligation of the vasa deferentia to effect shrinkage of the large prostate. In those days no one could offer a scientific explanation for the rationale of such a procedure. Lower's renewed interest concerning the relationship of the ductless glands and prostatic hypertrophy, spurred on animal experimentation and biochemical researches which laid the foundation for male hormone therapy. A brief resume of the numerous animal experiments and chemical researches is most revealing and timely. The clinician owes much to the painstaking and resourceful efforts of various research workers.

As far back as 1889 Brown-Sequard thought that the testes secrete an internal secretion. Pezard in 1918 began experiments with testicular extracts by the cock's comb method. In 1926 McGee extracted a lipoid soluble male sex hormone from bulls' testes. In 1930 Gallagher and Koch were the first to present a quantitative test for the presence of male sex hormone in urine. In 1931 Butenandt extracted a purified crystalline substance from male urine and called it androsterone (about 15 mg. of crystalline male hormone was extracted from 24,000 liters of human urine). In 1935 David and Laqueur isolated a crystalline substance, strongly androgenic, from fresh testes and called it testosterone. The amounts extracted were insufficient for clinical purposes; about 150-270 mg. of testosterone were extracted from one ton of bulls' testes. In 1935 Butenandt and later on Ruzicka independently synthesized this substance from cholesterol and called it testosterone propionate. The chemical formula is:



The literature also mentions gonadal "X" substances of Laqueur, which are supposed to prolong the action of testosterone.

Synthetic testosterone propionate is the most potent androgenic substance available and is five times stronger than the extract derived from the testes. Its use in hypogonadal or eunuchoidal men has demonstrated enlargement of the penis, scrotum, testes—with increased potency, increase in the amount of ejaculations, together with general improvement of the mental and physical condition. In castrated animals its use is followed by restoration to normal of the prostate and seminal vesicles. Analogous results are observed in capons and chicks; in the capon the volume of the comb is considerably increased and in the chick an increase in weight and in the size of the comb and plumage is noted.

In 1932 Lower and McCullough conducted a series of experiments, including parabiosis, in which a castrated and a normal male rat are twinned together through an artificial opening between the peritoneal cavities of the two animals. At the end of thirty days, the animals are autopsied. They found the prostate in the normal animal increased in size, 300 to 500 per cent; in the castrate the prostate remains small and atrophic, but the pituitary is increased in size. Parabiotic experiments permit an interchange and absorption of water soluble substances from one animal to the other through their peritoneal fluids; fat soluble substances are not transferred or absorbed through the peritoneal cavities. The water soluble gonadotropic hormone of the anterior pituitary of the castrate partner passes to the normal twin and stimulates its testes, resulting in enlargement of the prostate. Martins and Rocha also carried out parabiosis and were able to prevent hypertrophy of the prostate in the normal twin by intensive administration of water soluble testicular extract to the castrate partner; hyperactivity of the castrate's pituitary was also controlled. Meyers, Vigidoff and Hunter fed desiccated testes to rats, anticipating hypertrophy of the prostate. Atrophy, however, resulted. The animals were given 0.2 Gr. of testes, five times per week for a certain period. In due time these animals and control animals were autopsied and the following was noted:

The average weight of the control prostate was 0.535 Gr.

The average weight of the experimental prostate was 0.162 Gr.

From these experiments they believe that the fat soluble hormone of the testicle is not absorbed through the intestinal tract, whereas the water soluble substance is absorbed and exerts an inhibiting effect on the pituitary gland—resulting in prostatic atrophy. Other experiments independently conducted by Lower, Stickman, McCullough, Walsh, Moore, Owen, Cutter and De Jongh all tend to confirm the belief that the testicle possesses dual endocrine function. The germinal epithelia of the testicular tubules are believed to excrete a water soluble hormone during the active sex period of the male. With the first appearance of old age, it is said to be the first to give out because of atrophy of the germinal epithelia. It has not yet been isolated nor is its chemical formula known. It is called inhibin because it exerts a restraining action on the pituitary gland. De Jongh calls it the "pace-maker". Moore thinks that normally the interstitial and germinal hormones act as complements to each other. The clinical application of this hypothetical hormone for prostatism followed these experiments. All these experiments led to the use of inhibin hormone for prostatic hypertrophy.

Animal experiments by Laqueur, De Jongh, Zuckerman and Parker on monkeys showed an imbalance between the male and female hormones, mainly a diminution of male hormone and an excess of female hormone. They believe that prostatic hypertrophy is due to a change in the estrogenic-androgenic ratio and their experiments led them to the belief that the use of male hormone can prevent prostatic hypertrophy or cause

atrophy of an already hypertrophied prostate. Rush and Kundert's experiments in 1935 seem to confirm the estrogenic-androgenic imbalance. They determined the ratio of estrogen to androgen hormones in sixteen cases of prostatic hypertrophy and compared it with the ratio in twelve normal males. They found:

In the urine of normal males: 20.1 rat units estrogen, 55.1 gamma androgen.

In the urine of prostatic hypertrophy: 21.5 rat units estrogen, 21.8 gamma androgen.

Von Capellen and Burrows believe that an estrogen acting during pre-senility causes prostatic enlargement. It has been known that the female hormone, estrin, is present in male urine. Estrin together with androgen is supposed to control the action of the pituitary gland. On the other hand, Hamilton, Deming, Allen, Owen and Cutter were unable to demonstrate any unusual amount of estrogen in the urine of prostatic hypertrophy. In 1936, Hamilton, Deming and Allen assayed the urine of twelve cases of prostatism both before and after prostatectomy and found no significant amount of estrogen. In 1937 Hamilton, Heslin and Gilbert administered 500 to 1000 units of estrogen to nine prostatists over a period of thirty days. The symptoms were not affected by this treatment. In 1938 Moore and McLellan treated one group of patients with androgen and another group with estrogen injections before performing prostatectomy. After operation histologic examination of the glands revealed little, if any, change from the usual microscopic appearance of prostatic hypertrophy.

Why are good clinical results obtained from the use of male hormone therapy? At the moment it is too early to draw definite conclusions, especially in the face of conflicting and some unconfirmed experiments. Three different explanations are offered at the present time:

1. Lower and others advocate the use of inhibin on the premise that after a certain age, when the germinal epithelia cease to function and atrophy, this internal secretion is no longer available in the circulatory system. Hypersecretion of the anterior pituitary results, and it in turn stimulates an excess of male hormone from the testes producing glandular imbalance which brings on the clinical picture of prostatic hypertrophy. Lower advocates the use of inhibin for the large, spongy type of hyperplasia. His experience and that of others who have administered inhibin shows marked relief of subjective symptoms in 50 to 66 per cent of the treated cases. There is usually no change in the size of the prostate nor a lessening of the residual urine. Perhaps not enough time has yet elapsed for such changes.

2. Laqueur, De Jongh, Zuckerman and Parker believe that hormonal imbalance of the estrogen-androgen ratio, mainly a diminution of male hormone, causes prostatic hypertrophy. They advocate the use of concentrated male hormone to prevent hypertrophy or to effect atrophy of an already hypertrophied prostate.

3. Hamilton believes that relief of subjective symptoms results from increased muscle tonus of the detrusor bladder musculature. He also reports increased tonus of the muscles of the iris, the intestines, the heart and of the skeletal muscles.

Hormone therapy should be supplemented, when necessary, by prostatic massage for the expression of accumulated debris or pus and by bladder lavages and instillations of germicidal or anesthetic preparations (for tenesmus and urethral pains). Sulfanilamide or mandelic acid therapy should also be utilized for the relief of pyelonephritis and cystitis. All of us, from actual experience, know that these measures in themselves never bring about striking results, such as are seen from hormonal therapy itself.

The writer's series consists of 22 cases, each of which received a course of 30 injections of testosterone propionate (Perandren), 25 mg. dosage in combination with Androstine A and B. Androstine A and B is derived from whole testicle, the A ampule is the water-soluble inhibin and the B ampule is the fat-soluble testosterone hormone. Each intramuscular injection consists of an ampule of Perandren and an ampule of Androstine in the same syringe, alternating each time between the A and B substance. The Androstine preparations are utilized because the A ampule supplies the hypothetical hormone inhibin to restrain hyperaction of the pituitary and the B ampule prolongs the action of the testosterone propionate. No ill effects, either local or general, have been noted. After about ten treatments the nocturia is lessened and the patients describe a feeling of well-being, they are more alert mentally, the appetite is better, they sleep better and feel generally improved. Gradually the stream comes out easier and without difficulty, the referred pain at the glans penis subsides and there is practically no dribbling. In this series five impotent men, ranging between 55 to 66 years, had been impotent for more than two years. Before the treatments were concluded they reported return of libido and potentia and satisfactory coitus. In the group of cases that responded favorably to hormone therapy, there was practically no demonstrable change in the size of the prostate nor any decided diminution in the amount of residual urine. After a full course of treatment, some patients return about every ten days for a maintenance dose of 10 mg. testosterone propionate. Thus far these patients have remained relieved of their annoying subjective symptoms. If male hormone therapy were not available, these patients would either have been treated by transurethral resection or prostatectomy. The remaining cases also received full courses of hormone injections, but without any definite relief of the frequency, nocturia, dribbling, pain, etc. Most of them, however, reported general mental and physical improvement. Four patients of this group were resected, two had prostatectomy and the other six are still under observation. Testosterone propionate is also being used by the writer both before and after prostatectomy for its tonic effect. (Perandren, a commercial preparation, was supplied by the Ciba company for clinical study of these cases.)

This table summarizes the writer's personal experience:

A. Total number of cases treated with testosterone propionate	36
B. Total number cases receiving course of 30 injections	22
1. 10 of this series (45%) showed marked or complete relief of subjective symptoms. No definite decrease in the size of the prostate was noted. Residual urine was lessened in 5 cases.	
2. 12 of this series were not improved. Transurethral resection was done in 4 patients. Two-stage prostatectomy was done in 2 cases. The remaining 6 cases are still under observation.	
C. Fourteen patients, after receiving 5 to 10 injections, discontinued treatment for various reasons.	

CASE REPORTS

Two case reports, illustrating relief of subjective symptoms in typical cases of prostatic hypertrophy, are submitted:

Case 1. J. B. N., age 65, had the following complaints: dribbling, hesitancy, difficulty, urinated every hour during the day and five to seven times during the night. Symptoms had been present for over two years. He gave up social contacts because of an almost constant desire to void. He felt listless and tired from loss of sleep. He had typical symptoms of coronary disease for three years and was being treated by a cardiologist.

Urological examination disclosed 3 ounces of residual urine. Urinalysis: Specific gravity 1.024, acid reaction, pH 5.5, trace albumin, pus cells 1+ and occasional hyaline cast. The prostate was enlarged, firmly elastic and not indurated. Cystourethroscopy showed moderate trabeculation, but no stone, diverticulum or new growth. Urinary symptoms were due to a large middle lobe and two large lateral lobes in the prostatic urethra.

Male hormone therapy was advised because of the coronary lesion and because the patient feared operation. Testosterone propionate (Perandren) 25 mg. ampules with Androstine, alternating between the A and B ampule, were injected intramuscularly three times each week. He received a total of 30 injections. After the seventh injection he reported feeling more alert and active, only voided three times a night and stated he had a return of libido (absent 16 months). After the fourteenth injection the urinary stream was easy, there was no dribbling, hesitancy nor frequency, and he voided only once per night. He stated he performed satisfactory coitus (no coitus for almost two years prior to treatment). General improvement continued. At the completion of his course of treatment he voided four times during the day, there was no longer nocturia and difficulty, he felt more alert both mentally and physically, and sexual potency had returned. Rectally the prostate is about the same size as when first seen and the residual urine measures about 2 ounces.

Case 2. B. E., age 74, had the following complaints: painful urination, marked pain in bladder region, perineum and glans penis, marked hesitancy and difficulty in voiding, dribbling at the end, urinated every hour during day and three to eight times during the night. These symptoms had existed for three years and had aggravated during the past year. He had been under a physician's care for many years because of chronic myocarditis and arteriosclerosis. He was a poor surgical risk and readily accepted the hormone treatment.

Urological examination showed a large elastic prostate with 6 ounces of residual urine. The urethra was very spongy, bled easily, was very tender and the deep urethra felt definitely obstructed. Cystourethroscopy was not done because of his poor condition and the sensitive urethra.

He received a course of 25 injections of testosterone propionate (Perandren) 25 mg. with Androstine ampules A and B injected three times per week. No local treatments were given. Sulfanilamide was prescribed for a secondary cystitis. After the ninth injection he was voiding more easily, six times per day and once per night; the urethral and bladder pain was almost gone. After 14 injections he voided easily without pain, four to six times per day and no nocturia. When his course of

treatment was completed he had no urinary complaints, the stream was easy, he voided four to six times daily and none to one time per night. His mental and physical condition were markedly improved because he slept and ate more. The prostate did not decrease in size, but the residual urine became reduced, varying between 2 to 3 ounces. The pyuria cleared up after three weeks of sulfanilamide regimen.

CONCLUSIONS

Male hormone therapy, like other problems in endocrinology, is not yet an exact science. Its clinical use is relatively new and further experience will more definitely evaluate its rôle as a nonsurgical treatment of prostatism. Because it carries no risk and causes no ill effects, it should be tried especially in the debilitated and poor surgical risks; it should also be recommended to the relatively vigorous with early and later stages of prostatic enlargement. It seems to be most effective in the large, spongy type of prostatic enlargement. Patients with fibrotic median bar formations or mechanical occlusion of the bladder neck by large, intruding middle lobes, and those with urinary retention from long standing insidious prostatic disease, can hardly expect relief of their symptoms from hormone injections. Such cases should be hospitalized and treated surgically, either by transurethral resection or prostatectomy.

The growing literature on this subject reveals favorable clinical reports from several competent observers:

1. Lower	definite improvement in 65% of	76 patients
2. Laqueur	definite improvement in 66% of	133 patients
3. Day	definite improvement in 50% of	40 patients
4. McComb & Pearce	definite improvement in 40% of	17 patients
5. Hamilton & Gilbert	definite improvement in 63% of	11 patients

The writer's series comprises 22 patients, who received courses of 30 intramuscular injections. Forty-five per cent (10 cases) showed marked relief of all subjective symptoms and have thus far remained well. Some of them are receiving weekly maintenance doses. If male hormone therapy were not available to this group of patients, relief of symptoms could have been brought about only by surgery. At first only poor risk patients were selected, but good risk ones were also treated. During the course of treatment most patients reported general improvement both mentally and physically. Hormone therapy is also being used both before and after prostatectomy for its improvement of the tonus of muscles and for its salubrious effect on the mental condition. If very poor risk patients can be spared even the most palliative of surgical measures by a nonsurgical regimen, then male hormone therapy, still used empirically, is worth a trial.

Case Report

STENOSIS OF THE ESOPHAGUS DUE TO LYE BURN, INTENTIONALLY INDUCED

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Cicatricial stenosis of the esophagus is a common finding in endoscopic practice. The great majority of patients give a history of having swallowed lye or some similar corrosive substance, accidentally, during infancy or youth. The degree of stenosis varies greatly, depending upon many factors such as the amount of substance swallowed and the nature of the subsequent treatment. In some cases the contraction may be very marked, and the symptoms of dysphagia may be so severe as to call for vigorous, though cautious treatment.

The present instance involves the uncommon experience of being called upon to remove a foreign body from the esophagus of a woman who was fed lye as a child for the express purpose of making her unable to eat as much as other children. On the night of July 24, 1937, the writer was called to see M. J., aged 74, who had been gagging and choking violently for several hours. She stated that she had eaten cake at dinner and that she had choked upon a piece of nut from the top of the cake. She indicated that the piece was very small, and this immediately raised the suspicion that something might be wrong with the esophagus or the trachea. Inquiry as to the reason why so small a foreign body could cause such an obstruction, and pointed questioning regarding a possible history of the ingestion of lye brought forth the admission that she had swallowed lye when four years of age. It was fortunate that this history was obtained before beginning the endoscopy because it gave warning to proceed with caution.

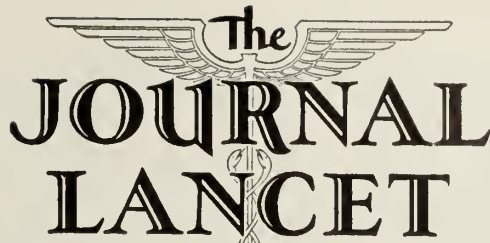
The trachea, larynx and hypopharynx were negative. Just below the pharyngeal opening of the esophagus, at the cricoid constriction, there was found a mass of scar tissue so great and so dense as to obliterate the lumen of the esophagus completely except for a tiny aperture not more than 3 millimeters in diameter near the anterior wall and somewhat to the left. At

this point there seemed to be a small, brown particle which was removed and found to be a tiny piece of nut about 3 millimeters in diameter. No dilator small enough was at hand so dilatation of the stricture was not possible at the time. This patient had purposely been given an ether anesthetic because it was desired to relax any spasm which might be present. The next day she stated that although her pharynx was a little uncomfortable, she was able to swallow better than she had been for several months. Evidently the obstructing particle had been removed and the spasm was relaxed.

The patient stated that when she was a few months old her father, who had been the captain of a sailing vessel, was drowned at sea. A short time later her mother also died and she was adopted by a family in which there were already seven children. When she was four years old, an itinerant saleswoman, carrying various household articles, came to their house and suggested to her foster-mother that she put some lye into the child's food in order to produce a stricture in the food passage so that the child would not eat so much. This was done. The child suffered for a long time. Finally when the patient was eight years old, that is, four years later, her foster-mother confessed to the little girl what she had done.

It is remarkable to reflect that this patient was able to live 70 years with an esophagus which was so constricted. Even if we assume that the stricture became much more marked during her later years, still it is certain that the stenosis was marked from the beginning. Her ability to exist with such an obstruction is explained only by the fact that she always chewed her food so thoroughly that it was practically in a fluid state when it passed through the constriction. When seen by the writer she was very emaciated, and although she recovered from the esophagoscopy without any trouble, the long-standing emaciation, weakness, and exhaustion, combined with a variety of other conditions (extreme anemia, etc.) caused her to become so weak that several weeks later she died.

She had been married some 50 years, and had borne three children. Two of these are still living and state that she had always been an active woman.



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W. L. Klein, 1851-1931

MINNEAPOLIS, MINN., JUNE, 1939

THE FOURTH OF JULY AND ITS ACCIDENTS

The June 1938 number of *The Child*, a monthly periodical published by the Federal Children's Bureau, quotes the National Association for the Prevention of Blindness as offering the following suggestions to parents:

1. Use no fireworks and make it impossible for your children to use fireworks before or after the Fourth of July;
2. If you do use fireworks on the Fourth of July, do not permit little children to handle them. There is no such thing as safe fireworks for little children. Deaths have been caused by so-called harmless sparklers and by other apparently "harmless" fireworks.

The same article also quotes the *Journal of the American Medical Association* as authority for the fact that there were twenty deaths in the year 1937 due to Fourth of July fireworks, and that the total number of injuries

recorded were 7,205. For a nation of about 125 million people, these records of deaths and accidents do not count for much in themselves, even allowing that the numbers could be increased manyfold. It hardly seems probable that the warnings of the national society for prevention, etc., will have much weight. Even in towns and cities where the police authorities issue orders against the use of fireworks on any day but the National Fourth, some several days and nights prior to the national holiday are made almost unbearable from fireworks noise demonstrated not only by the kiddies but often by adults, who should know better but evidently don't care for public welfare and peace.

A. W. S.

THE MEDICAL DIRECTORIES' RACKET

The deficit in the United States Post Office Department, caused mainly we are told from the franking system of the senators and the representatives, is now being partly offset by a supply of enticing literature

sent into this North Dakota drought area. For an initiation fee of only five dollars (the "milk in the coconut") this Eastern concern will register in a directory specially qualified doctors (*all* doctors with the five dollars' remittance probably eligible) to share annually in the stated large amount of money to be paid by health and accident insurance companies. It is intimated that the names nesting in this directory will always be consulted by all types of insurance companies, to find physicians suitable through high moral character and ability necessary for this responsible work. Although the fees enclosed with the come-on letter as compared with the modest revenue received in the present federal-state set-up in North Dakota, make one year for those generous checks promised for those named in the directory, the doctors better hold fast to their five dollars, and thus avoid being impaled in the lists of sucker physicians.

Upon application, the Bureau of Medical Economics, American Medical Association, 535 North Dearborn Street, Chicago, will send a copy of its pamphlet entitled "Medical Directories."

A. W. S.

POLITICAL DICTATION

There's a story of the tourist, who, on reaching the outskirts of Asheville, North Carolina, accosted a colored boy to inquire the way to a certain hotel. After several attempts, in each of which he became confused by the intricacies of the turns and distances that he

would describe, he concluded by saying, "Well, sah, if ah was goin' to that tha' hotel, ah sho' wouldn't sta't from heah."

So much gloom has been painted about the future of medical practice that we are in danger of losing our sense of location. If medicine were starting from here, it would be different. We might then have reason to hesitate at barricades placed in our way. But it is not. It started centuries ago, and it is going right on from here regardless of any political pressure that would seem to threaten its progress.

Criticism of the profession is nothing new. We have frequently been censured for holding to certain standards of conduct among our members when the purposes of these carefully formulated principles have only been to serve the very best interests of the people as a whole. We would "try all things and cleave to that which is good," and no power on earth can persuade us to deviate unless it be for something better. We do not believe, however, that regimentation of the profession by demagogic coercion will serve a constructive purpose. We will not box the compass on orders from inexperienced and visionary dictators; and the more force they apply, the more closely will we be cemented together in our purpose.

Napoleon said, "I am amazed at the impotence of force to do creative work." The medical profession is doing creative work, and it deplores the destructive forces at work to discredit its efforts. It is the laity who suffer most when their confidence in the profession is shaken.

A. E. H.

Book Reviews

The American Illustrated Medical Dictionary, a complete dictionary of the terms used in medicine, surgery, dentistry, pharmacy, chemistry, nursing, veterinary science, biology, medical biography, etc.; with pronunciation, derivation and definitions by W. A. NEWMAN DORLAN, M.D., A.M., F.A.C.S., Lieutenant-Colonel, M.R.C., U. S. Army, member committee on nomenclature and classification of diseases of the American Medical Association, editor; 18th edition, revised and enlarged with 942 illustrations, including 283 portraits, with the collaboration of E. C. L. MILLER, M.D., Medical College of Virginia; Philadelphia and London: W. B. Saunders Co., 1938.

The 18th edition of the *American Illustrated Medical Dictionary* includes 3,000 additional new words. New terms have appeared in medical literature with such astounding rapidity that each page of this edition contains one or more new definitions. The largest number of improvements and additions appear in the fields of endocrinology, immunology, pathology, medical chemistry, clinical medicine and dentistry, while the terminology of biopsychology has been greatly enriched. In fact, new terms are distributed throughout the entire realm of medicine and the related sciences, and in doing so, the text of the 18th edition of the *American Illustrated Medical Dictionary* has been increased by more than 60 pages. This volume still retains the leadership in the medical dictionary field.

How to Conquer Constipation, by J. F. MONTAGUE, M.D., editor-in-chief of *Health Digest*; medical director New York Intestinal Sanitarium; American Association for the Advancement of Science; American Society for the Control of Cancer;

late of University and Bellevue Hospital Medical College; Philadelphia and New York: Lippincott Co., 1938.

Because constipation is nearly a universal ailment and because doctors as a rule are inclined to pass over this condition lightly, this book presents fearless, authoritative statements concerning constipation. It should take a prominent place in every family medicine chest. The majority of people treat their own constipation by self-medication, relying on their own devices and circulation as to what constitutes proper treatment. Since advertisers are well aware of this tendency, their wares describing "What's good for constipation" have a ready sale.

Answers are given in this small book to such questions as "What can man really believe about constipation?", "How can a person protect himself from constipation?", and "Why is constipation so prevalent and so persistent?"

The 1938 Year Book of Pediatrics, edited by ISAAC A. ABT, D.Sc., M.D., with the collaboration of ARTHUR F. ABT, B.S., M.D., professor of pediatrics, Northwestern University School of Medicine, Chicago; Chicago: The Year Book Publishers, Inc. Price, \$2.50.

The 1938 *Year Book of Pediatrics* maintains its very high editorial level. Two special features are included in this volume. The first is an introductory article of 25 pages on "Hormones in Relation to Growth and Development," written by Dr. ISAAC A. ABT. This feature discusses the various hormones used for promoting growth, their dosages, their methods of administration, and their indications. Dr. ABT also develops the relationship of vitamins to hormones in a very comprehensive, clear and sound manner.

The second special feature of this volume is an article by Dr. WILLIAM BROWN, physician to the Hospital for Sick Children, Aberdeen, Scotland, on "The Study of the Face and the Facial Expression of the Sick Child." It is illustrated by 52 photographs which Dr. BROWN loaned from his personal collection.

Future Meetings

MEDICAL ASSOCIATION OF MONTANA Program

Sixty-first Annual Scientific Session

June 28, 29, 30, 1939

Finlen Hotel, Butte

Wednesday, June 28

- 8:30 a. m. "Splenectomy in the Treatment of Blood Diseases," CARL VERNON MOORE, M.D., Assistant Professor of Medicine, Washington University School of Medicine.
- 9:45 a. m. "Bladder Obstruction, Male and Female," DALTON KEETS ROSE, M.D., Associate Professor of Clinical Genito-Urinary Surgery, Washington University School of Medicine.
- 11:00 a. m. "Caesarean Section—Its Indication, Technique, and Results," CHARLES DARRELL O'KEEFE, M.D., Assistant Professor of Clinical Obstetrics and Gynecology, Washington University School of Medicine.
- 2:00 p. m. "The Management of Compound Injuries of the Face and Jaws," JAMES BARRATT BROWN, M.D., Associate Professor of Clinical Surgery, Washington University School of Medicine.
- 3:00 p. m. "Head Injuries," ERNEST SACHS, M.D., Professor of Clinical Neurological Surgery, Washington University School of Medicine.
- 4:30 p. m. Meeting of Councillors.
- 8:00 p. m. Smoker (for Doctors and their Wives, Golden Fan Night Club, Meaderville).

Thursday, June 29

- 8:30 a. m. "The Repair of Surface Defects Due to Burns and Other Causes," JAMES BARRATT BROWN, M.D.
- 9:45 a. m. "The Present Status of Surgery of Brain Tumors," ERNEST SACHS, M.D.
- 11:00 a. m. "Recent Advances in the Understanding and Treatment of Deficiency Diseases," CARL VERNON MOORE, M.D.
- 2:00 p. m. "Endometriosis," CHARLES DARRELL O'KEEFE, M.D.
- 3:00 p. m. "Neurogenic Bladder, Particularly in the Application of Handling Those Seen in Association with Ever Increasing Automobile Accidents," DALTON KEETS ROSE, M.D.
- 7:00 p. m. Banquet, Finlen Hotel Main Dining Room. Principal Address: ROCK SLEYSER, M.D., President of the American Medical Association, "Medical Problems of the Day." Toastmaster: C. E. Emery, M.D., Butte.

Friday, June 30

- 8:30 a. m. to 12:00 m. Business Meeting of the House of Delegates.
- 1:30 p. m. House of Delegates.
- 2:00 p. m. "Group Hospitalization," A. G. Stasel, Business Manager, Nicollet Clinic, Minneapolis, Minnesota.

Saturday, July 1

Completion of Unfinished Business of the House of Delegates. ELECTION OF OFFICERS.

GREAT NORTHERN RAILWAY SURGEONS' ASSOCIATION

Tentative Program

1939 Meeting at Glacier Park Hotel

Glacier Park, Montana

Friday and Saturday, June 30 and July 1

1. "Management of Traumatic Wounds," C. J. GLASPEL, M.D., Grafton, North Dakota.
2. "Repair of Tendons," H. E. CLEVELAND, M.D., Burlington, Washington.
3. "Rupture and Repair of an Ossified Tendon of Achilles," H. J. KNOTT, M.D., Seattle, Washington.
4. "Emergency Ophthalmology," JAMES E. REEDER, M.D., Sioux City, Iowa.
5. "Management of Opacities of the Cornea," F. A. KIEHLE, M.D., Portland, Oregon.
6. "Coronary Disease Among Railroad Employees," CHAS. BENJAMIN WRIGHT, M.D., Professor of Medicine, University of Minnesota, Minneapolis, Minnesota.
7. "Tetanus: Report of a Case Complicated by Lordosis," H. E. WHEELER, M.D., Spokane, Washington.
8. "Osteomyelitis," A. C. BAKER, M.D., Fergus Falls, Minnesota.
9. "Traumatic Appendicitis," G. N. PEASE, M.D., Portland, Oregon.
10. "Traumatic Rupture of the Kidney," A. N. COLLINS, M.D., Duluth, Minnesota.
11. "Traumatic Rupture of the Normal Spleen with Delayed Hemorrhage," R. C. WEBB, M.D., Minneapolis, Minnesota.
12. "Disability of the Knee Joint Following Injury," O. W. SCHOLPP, M.D., Hutchinson, Minnesota.
13. "Fractures of the OS Calcis," O. W. YOERG, M.D., Division Surgeon, The Milwaukee Railroad, Minneapolis, Minnesota.
14. "Fractures of the Metatarsal Bones," B. J. BRANTON, M.D., Willmar, Minnesota.
15. "Emergency Care and Transportation of Fractures of the Long Bones." (Moving Pictures).

GOLF TOURNAMENT: Friday afternoon at 2:00 o'clock.

BANQUET: Friday evening at 7:00 o'clock.

MEMBERS OF THE MEDICAL PROFESSION ARE CORDIALLY INVITED.

News Items

Dr. C. J. Glaspel, Grafton, was named president-elect of the North Dakota State Medical Association, May 9, 1939, at the annual convention held in Fargo. Dr. H. A. Brandes, Bismarck, named president-elect last year, took over the presidency succeeding Dr. W. H. Long, Fargo. Other officers named are: Dr. W. H. Fergusson, Kulm, first vice-president; Dr. A. R. Sorenson, Minot, second vice-president; Dr. A. W. Skelsey, Fargo, re-elected secretary; Dr. W. W. Woods, Jamestown, re-elected treasurer. Dr. A. P. Nachtwey, Dickinson, was named delegate-at-large to the American Medical Association convention and Dr. C. E. Stackhouse, Bismarck, alternate.

Dr. James R. Thompson, formerly of Akron, Ohio, is now associated with Dr. A. R. Varco, Miles City, Montana.

The new 75-bed addition to the Fargo (North Dakota) Veterans Hospital will be ready for use this month. Dr. W. L. Fleck, recently transferred from Jefferson Barracks, Missouri, is the new chief medical officer of the hospital.

Dr. P. S. Hench, Rochester, Minnesota, has been elected an honorary member of the Royal Society of Medicine, section on physical medicine, England.

Dr. Maurice Borkon is now practicing in Kalispell, Montana. Dr. Borkon was graduated from the University of Minnesota Medical School in 1934 and practiced in Whitefish until last year when he went to New York for postgraduate work. He practiced a short time in Spokane before coming to Kalispell.

Dr. W. A. Wright, Williston, has been elected president of the North Dakota Health Officers association. Dr. T. C. Patterson, Lisbon, is vice president and Dr. Maysil Williams, Bismarck, secretary.

Dr. Robert B. Radl, Bismarck, North Dakota, has been appointed Burleigh county health officer to replace Dr. L. W. Larson, Bismarck, who recently resigned.

Dr. E. G. Nicholson, Lawton, North Dakota, has accepted the request of Fairdale residents that he become their community doctor. Dr. Nicholson was recently honored by Lawton citizens on the occasion of his 36th anniversary of service in Lawton.

The annual crippled children's clinic for children in Gallatin, Park, Madison, Jefferson, Broadwater and Meagher counties, Montana, was held in Bozeman, Montana, May 10 and 11. Dr. Louis W. Allard, orthopedic surgeon of Billings, was chief consultant.

Dr. R. P. Pearsall, city health officer of Virginia, Minnesota, was general chairman of local arrangements for the all-day postgraduate course in the care of mothers and babies given for Range physicians at the municipal hospital, Virginia, May 10, 1939.

Dr. William Davis, St. Paul, Minnesota, has retired after sixty years of practice.

Dr. Joseph L. Garten, who recently completed a three year fellowship in ophthalmology and otolaryngology at the Minneapolis General Hospital, is now associated with Drs. Malcolm C. Pfunder and E. J. Borgeson, Medical Arts Building, Minneapolis, Minnesota.

Dr. M. R. Snodgrass of Miles City, Montana, has become associated with Dr. Floyd J. Malloy in Anaconda. A graduate of the School of Medicine at the University of Michigan, Dr. Snodgrass took three years of postgraduate work at Harvard University and recently completed a postgraduate course at the Mayo Clinic, Rochester.

Dr. L. J. Alger, Grand Forks, North Dakota, recently returned from India where he did eye surgery under Sir Henry Holland in a charity eye hospital in Shikapur.

Written examinations for certification by the American Board of Internal Medicine will be held in various sections of the United States on the third Monday in October and the third Monday in February. Formal application must be received by the Secretary before August 20, 1939, for the October 16, 1939, examination, and on or before January 1 for the February 19, 1940, examination. Application forms may be obtained from Dr. William S. Middleton, Secretary-Treasurer, 1301 University Avenue, Madison, Wisconsin, U. S. A.

ATTENTION SECRETARIES OF DISTRICT SOCIETIES

Space is at your disposal in *The Journal-Lancet* for advance notices and reports of meetings of your society and personal news items concerning members of your society. County and district secretaries are invited to forward such material to *The Journal-Lancet*, 84 S. 10th St., Minneapolis.

Necrology

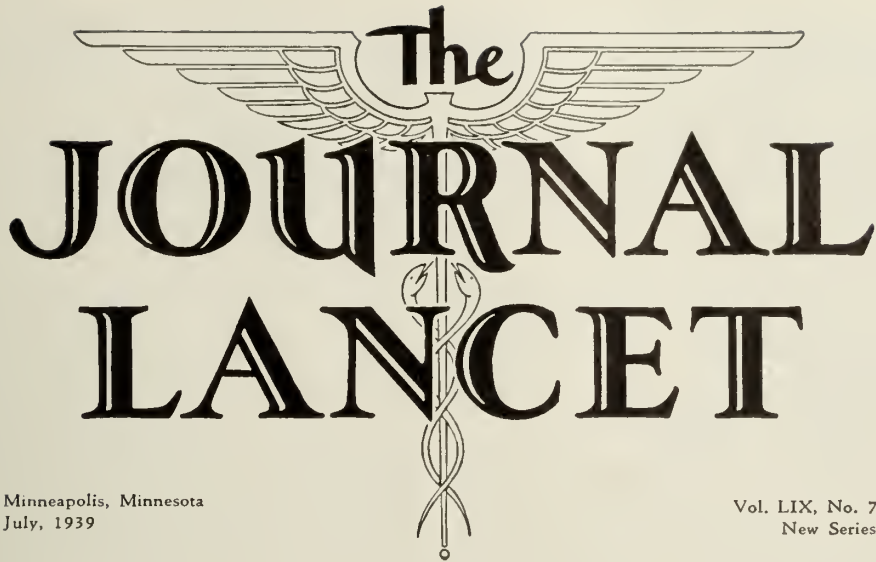
Dr. E. O. Voyer, 65, formerly of Minneapolis, Minnesota, died in Los Angeles, California, April 12, 1939. Dr. Voyer had been a resident of Minneapolis 30 years before moving to the coast two years ago.

Dr. J. L. Stephenson, 81, practicing physician of Ellendale, North Dakota, for many years, died at his home in Santa Ana, California, recently.

Dr. McClelland Shellman, 30, a graduate of the University of Minnesota Medical School in 1933, died in New York City May 5, 1939.

Dr. G. H. Burfiend, 60, St. Paul, Minnesota, died April 6, 1939. He had practiced in St. Paul since 1920.

Dr. Herbert F. Kenny, 50, formerly of St. Paul, Minnesota, died at his home in Waukesha, Wisconsin, April 14, 1939.



The JOURNAL LANCET

Minneapolis, Minnesota
July, 1939

Vol. LIX, No. 7
New Series

Transactions of the South Dakota State Medical Association

Fifty-Eighth Annual Session
Aberdeen, South Dakota
April 24, 25, 26, 1939

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J. F. D. COOK, M.D.	Pierre

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1939-40	
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O. J. MABEE, M.D.	Mitchell
C. E. SHERWOOD, M.D.	Madison
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THE COUNCIL	
PUBLICATIONS	
Section 4	
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GEORGE RICHARDS, M.D. (1941)	Watertown
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MEDICAL EDUCATION AND HOSPITALS	
WALTER DAWLEY, M.D. (1940)	Rapid City
FARIS PFISTER, M.D. (1941)	Webster
F. J. ABTS, M.D. (1942)	Yankton

MEDICAL ECONOMICS

P. R. BILLINGSLEY, M.D. (1940) Sioux Falls
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 T. F. RIGGS, M.D. (1942) Pierre

PUBLIC HEALTH

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 F. S. HOWE, M.D. (1941) Deadwood
 J. V. SHERWOOD, M.D. (1942) Sanator
Sub-Committee on Mental Hygiene and Child Welfare:
 W. E. MORSE, M.D. (1940) Rapid City
 F. V. WILLHITE, M.D. (1941) Redfield
 GOLDIE ZIMMERMAN, M.D. (1942) Sioux Falls

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 U. S. P. H. Service:*

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 A. O. CARMACK, M.D. (1941) Colome
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 M. W. PANGBURN, M.D. Miller

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COMMITTEE ON STAFFORD MEMORIAL FUND

For scholarship at the University of South Dakota

J. C. OHLMACHER, M.D. Vermillion
 C. E. SHERWOOD, M.D. Madison

COMMITTEE ARMY MEDICAL LIBRARY AND MUSEUM

J. C. SHIRLEY, M.D. Huron
 C. E. SHERWOOD, M.D. Madison

ANNUAL MEETING OF THE COUNCIL OF THE
 SOUTH DAKOTA STATE MEDICAL
 ASSOCIATION

First Meeting of the Council

Monday, April 24, 1939—10:00 A. M.

The Council was called to order by Dr. S. M. Hohf, Chairman, at 10:00 a. m., Monday, April 24, 1939, at the Alonzo Ward Hotel, Aberdeen, South Dakota.

Roll Call: Drs. J. C. Shirley, C. E. Sherwood, B. A. Dyar, J. R. Westaby, J. D. Whiteside, W. G. Magee, D. S. Baughman, B. M. Hert, J. H. Lloyd, W. E. Donahoe, S. M. Hohf, R. B. Fleeper, C. E. Lowe, Wm. Duncan, and E. A. Pittenger. Quorum present.

The Secretary presented for approval the minutes of the 1938 annual meeting as printed in the July 1938 JOURNAL-LANCET; also the minutes of Council meetings held June 17, July 13, September 12, November 29, January 18, and February 14. Minutes were approved.

The report of the Secretary-Treasurer was given by Dr. Sherwood. It was moved by Dr. Duncan and seconded by Dr. Fleeper that the report be accepted and submitted to the Auditing Committee. Motion passed.

The report of the Committee on Arrangements was submitted by Dr. Sherwood. Dr. Shirley moved that the report of this Committee be accepted and placed on file. Motion seconded and passed.

The report of the Executive Secretary was given by Dr. Dyar. Dr. Dyar first reported on the payment of services for care supplied old age assistance recipients. He stated that according to the Social Security Law, the money allocated for medical care must go directly to the client. This has not worked out satisfactorily for in many instances after the client has received medical service and received money to pay the doctor, he does not always use the money for that purpose. Some plan should be worked out whereby the doctor can be assured of receiving compensation for rendering service to old age assistance recipients. Each old age assistance recipient is allowed a maximum of \$12 a year for medical care. Dr. Dyar next reported on the medical relief program and presented Council members with a statistical study covering the first five months of the present program. It was brought out that the program had not worked out successfully because of inadequate supervision, misunderstanding on the part of the Farmers Aid Corporation members and also the professional people participating, concerning the limitations of the program, and lastly, insufficient funds. Dr. Dyar stressed the necessity of the doctors formulating a plan of medical relief which they found desirable, providing they wished to endorse a plan, and submitting it to the Inter-Allied Council for consideration. If such plan is found satisfactory, it will be submitted to the officials of the Farm Security Administration for final action. Dr. Dyar asked to be relieved of the duties of Executive Secretary of the State Medical Association.

Old Business. A letter was read by Dr. Sherwood from the Vermillion District Medical Society concerning the matter of Dr. L. A. Haug's membership in that District Medical Society. This matter was discussed. It was moved by Dr. Pittenger and seconded by Dr. Whiteside that the 8th District Medical Society be reimbursed for the membership fee paid by Dr. Haug who has not been elected to membership in the State Medical Society, less the amount of the subscription to the JOURNAL-LANCET. *Motion carried.*

A letter was read by Dr. Sherwood from the Mitchell District Medical Society concerning a tonsil clinic advertised by Dr. R. P. Frink of Wessington Springs. It was moved by Dr. Westaby and seconded by Dr. Pittenger that this matter be referred back to the Mitchell District Medical Society for action. *Motion carried.*

New Business. The matter of redistricting the medical societies of the State was presented by Dr. Sherwood. A discussion was held. It was moved by Dr. Magee and seconded by Dr. Duncan that the medical societies be redistricted as presented by the Secretary. *Motion carried.*

The matter of doctors living in border states and practicing in South Dakota was discussed.

Dr. Sherwood presented a budget for next year in accordance to the by-laws of the State Medical Association. It was moved by Dr. Hart and seconded by Dr. Magee that the proposed budget be laid on the table until the next meeting of the Council. *Motion carried.*

Mr. Cohen, representing the JOURNAL-LANCET appeared before the Councilors and took up the matter of subscription rates of the JOURNAL-LANCET. It was moved by Dr. Magee and seconded by Dr. Fleeger that the subscription to the JOURNAL-LANCET for the coming year be raised from \$1.50 to \$1.75 and the price thereafter will be \$2.00 per year. *Motion carried.*

The chairman appointed the following doctors to serve on the Auditing Committee: Drs. Magee, Duncan, and Baughman. Meeting adjourned.

CLARENCE E. SHERWOOD, M.D.,
Secretary.

Report of Secretary-Treasurer

April 22, 1939

May 7, 1938, Balance on Hand	\$1,976.89
Receipts—	
Back dues received for 1938	482.00
Huron Exhibit Profits	65.93
Trust Certificate, Langford State Bank No. 375 ..	183.98
1939 dues at \$10.00—231 members	2,310.00
	\$5,018.80

Disbursements—	
Marvin Hughitt Hotel Guests	\$ 71.24
Expenses Railroad for Speakers	143.90
Bank Exchange and float charge	1.25
Printing and Supplies	111.20
Salary Executive Secretary	600.00
Salary Secretary-Treasurer	600.00
Expenses Secretary-Treasurer, Travel	19.37
Telephone Toll	46.67
Badges State Meeting 1939	18.59
Programs State Meeting 1939	55.45
Postage	97.96
Bond Secretary-Treasurer	5.00
JOURNAL-LANCET Subscriptions	657.75
Council Dinner	24.73
Delegate A. M. A. Expense	143.00
Inter-Allied Council	50.00
Miscellaneous	26.50
	\$2,672.61

Balance on Hand April 22, 1939	\$2,346.19
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Legislative Fund

	Expenditures
Karl Goldsmith	\$1,166.83
Postage	38.46
Council	292.36
Telephone and Telegraph	348.02
Printing	138.81
Miscellaneous	102.65
Total	\$2,087.13

District	Receipts	Expenditures
1	\$ 357.50	\$ 115.02
2	80.00	
3	270.00	43.22
4	225.00	9.02
5	55.00	30.00
6	332.00	109.22
7	254.00	50.60
8	471.84	50.00
9	335.00	10.84
10	50.00	
11		
12	187.50	59.43
Central Office, Madison		1,609.78
	\$2,617.84	\$2,087.13
Balance on Hand April 22, 1939		\$530.71

Membership by Districts

April 22, 1939

Aberdeen District Number 1	31
Watertown District Number 2	21
Madison District Number 3	22
Pierre District Number 4	12
Huron District Number 5	14
Mitchell District Number 6	22
Sioux Falls District Number 7	44
Yankton District Number 8	31
Black Hills District Number 9	20
Rosebud District Number 10	6
Northwest District Number 11	8
Whetstone Valley District Number 12	

Members	231
Honorary Members	10
Total	241

Total Number of Doctors in state	562
Number of Doctors deceased during year	10

CLARENCE E. SHERWOOD, M.D.,
Secretary-Treasurer.

Second Meeting of the Council

Wednesday, April 26, 1939—7:00 A. M.

The second meeting of the Council was held at 7:00 a. m., Wednesday, April 26, 1939. Chairman, Dr. S. M. Hohf, presiding.

Roll Call: Drs. J. C. Shirley, C. E. Sherwood, B. A. Dyar, J. D. Whiteside, W. G. Magee, C. E. Lowe, D. S. Baughman, B. M. Hart, J. H. Lloyd, W. E. Donahoe, S. M. Hohf, R. B. Fleeger, J. R. Westaby. Quorum present.

The report of the auditing committee was given. It was moved and seconded that this report be accepted. *Motion carried.*

Legislative matters as they applied to the State Medical Association and the medical profession in the State were discussed.

Dr. Magee moved that the money collected for the special legislative fund be put into a special fund and so remain for future legislative needs and an effort be made to collect the money assessed each District of the Medical Association for this purpose which has not been previously paid, to be added to the special fund. *Motion seconded and carried.*

Dr. Baughman moved that the State Medical Association try to retain Karl Goldsmith as its legal advisor at an annual regular retainer and that a committee contact Mr. Goldsmith and report their results together with the retainer that he may request to the officers of the State Medical Society. *Motion seconded and carried.*

Dr. Riggs was appointed chairman of this committee.

The matter of continuing the office of Executive Secretary was thoroughly discussed.

Dr. Donahoe moved that Dr. Dyar's resignation be accepted and that the duties of the office be carried on by the Secretary of the State Association, and the office of Executive Secretary be declared vacant for the time being. Motion seconded by Dr. Lloyd and carried.

Dr. Baughman moved that the State Medical Association turn the Executive Secretary's salary over to Dr. Sherwood for the time being for carrying on the duties that were previously performed by the Executive Secretary. Motion seconded by Dr. Lowe and passed.

Dr. Riggs, chairman of the committee to draft a new medical relief program, reported on the plan agreed upon by the committee. Some recommended changes were made. The report is as follows:

The following is a proposed outline of a plan submitted to the Council of the State Medical Association by the undersigned committee appointed by the President of the State Medical Association which met with the approval of the Council. This plan is being presented to the Inter-Allied Council for consideration and completion of necessary details. The plan will then be submitted to the board of directors of the Farmers Aid Corporation for final action.

We, the undersigned members of your committee appointed by the President of the State Medical Association for the study and organization of a new setup for the emergency care of the needy clients of the Farm Security Administration take leave to report as follows:

1. History of the attempt to provide medical care for clients of the Farm Security Administration:

The Inter-Allied Professional Council held its first meeting September 3, 1935, in Huron. At that time the question of medical relief was not under consideration.

On August 23, 1936, at Rapid City, the first meeting of the Inter-Allied Council relative to medical relief was held at the Alex Johnson Hotel. At this meeting Dr. R. C. Williams, Medical Director of the Resettlement Administration of Washington, was present and was informed of the situation as it existed among the five professions at that time. This meeting was held merely to acquaint Dr. Williams with the situation as it applied to the professions of the Inter-Allied Council. He was assured that a medical relief plan would have to be worked out after adequate data had been secured and the plan submitted to the Resettlement officials in Washington for their point of view.

The next meeting was held at Huron, October 20, 1936. At this time Dr. Williams briefly explained the plan of organization. After discussion, the relief setup was endorsed for one year.

On December 10, 1936, the Inter-Allied Council met in Huron and was informed that the relief program as worked out by Dr. Williams of Washington in connection with the various allied groups had been accepted by the State Medical Association and put into effect for the period of one year.

On November 3, 1937, at a meeting, Dr. Williams set forth the principles of a new plan proposed to take care of all members of the Farm Security Administration in the state. Mr. Cal Ward, Regional Director of the Farm Security Administration, was also present and explained the work of the funds available for this program and stressed the need of the Councilors to formulate a plan which would adequately provide for relief through the winter. At this meeting, the following resolution was presented to the Inter-Allied Council by the Council of the State Medical Association: "It is the sense of this Council that in the emergency medical care of clients of the Farm Security Administration we accept the plan of prorating the cost between the physicians, dentists, druggists, hospitals and other expenses according to the average expense of the North Dakota Farmers Aid Corporation in that State." This resolution was adopted by the Inter-Allied Council.

On March 16, 1938, the money available for the operating of the Farmers Aid Corporation program was discussed and divided as follows: Physicians to receive 51 per cent, hospitals 39 per cent, dentists 6 per cent, drug-

gists 3 per cent and nurses 1 per cent. This proportion was not found satisfactory and was changed later so that the hospitals received a little larger percent than these figures show. This setup stayed in force until June 30, 1938, and from then until November 1, 1938, the professions were on their own.

On September 12, 1938, the Inter-Allied Council met and discussed plans for the present setup that went into operation November 1, 1938.

The funds necessary to conduct these setups were secured from the Farm Security Administration and it demanded that a legally organized corporation under the laws of South Dakota be organized to handle the money, this organization to be known as the Farmers Aid Corporation. The directors of this Corporation were required to be two representatives of the Farm Security Administration, two officers of the State Welfare Board and the Medical Director of the Farm Security Administration who was loaned to the Farm Security Administration by the United States Public Health Service. The funds which come into this organization and are distributed by it must be repaid, if possible, to the government through the same organization which paid the money into the organization, technically organized in the form of a private corporation. It stands as a buffer between the government and the clients and since this is a private corporation, bills owed to it are subject to the same laws of collection and outlawing of accounts the same as any other business corporation. Each separate organization represented by the Inter-Allied Council accepted this plan and signed the understanding.

2. That the Farmers Aid Corporation and its present administration bring its organization up-to-date.

3. That the Farm Security Administration through its present channels determine actual needs of its clients. This means that a special effort on the part of the Farm Security Administration should be made to thoroughly investigate the actual and real needs of its clients, and that no card shall be issued except to those in absolute need.

4. That clients found eligible for emergency medical care pay an initial fee of \$5.00 to provide a fund for the immediate payment of bills for their emergency medical care.

5. That the client shall understand that he will be required to give a note to the Farmers Aid Corporation at the end of each month for all services received during that month. It is understood that this note pays for all services for that month in full and no additional charge can be made by members of the various professions.

6. That any client withdrawing from the Farmers Aid Corporation or who is dropped for any reason from the Farmers Aid Corporation forfeits his initial fee, this initial fee being regarded as insurance against possible emergency illnesses and accidents.

7. That each of the allied professions provide a fee schedule under which the work shall be done and that it is understood that the fee schedule shall be paid 100 per cent on approved bills.

8. That every individual member of the Inter-Allied group willing to participate under this emergency relief setup shall sign an agreement which will enable the clients to make their choice from this list of signers. The foregoing is entirely optional with each individual member of the allied professions. Payment for services will only be given to the members of the allied professions who have signed this agreement. Clients consulting other members of the allied professions not on this list must pay for services rendered from their own funds. Members of the allied professions are to be given a list of those signing this agreement for the purposes of reference.

9. That drugs prescribed under this setup be U. S. P. and N. F. drugs accepted by the Council of Pharmacy of the American Medical Association, except sera and biologicals, the majority of which may be obtained from the State Health Department, and that no drugs dispensed by physicians will be paid for and that no counter-prescribing will be paid for and that prescriptions can only be filled by registered pharmacists.

10. That emergency medical care means exactly what it says and shall be confined to acute infections, accidents, hem-

orrhages, perforations, obstructions, strangulations, confinements. Payment will be made for no tonsillectomies except where secondary complications make it imperative.

11. That each district medical society shall, through its officers, appoint an auditing committee consisting of three members from its membership, to go over the accounts as rendered by members of that district society before turning them into the state office.

- N. K. HOPKINS, M.D., *Chairman*
- T. F. RIGGS, M.D.
- J. O. F. KRAUSHAAR, M.D.
- B. A. DYAR, M.D.

Dr. Sherwood moved adoption and approval of the report of this committee for consideration of a medical relief plan. Motion seconded by Dr. Whiteside and passed.

Dr. Sherwood moved that the report of this committee be referred to the medical representatives on the Inter-Allied Council to be used in principle as a basis for negotiation in framing a plan for the care of the indigent FSA clients. *Motion seconded and passed.*

Dr. Donahoe moved that the Council extend to Dr. Dyar a vote of confidence and appreciation for his work as Medical Supervisor of the Farmers Aid Corporation. Motion seconded by Dr. Hart and passed.

Election of Chairman. Dr. Fleeger moved that Dr. Hohf be elected Chairman of the Council for the coming year. *Motion seconded and passed.*

There being no further business, the meeting adjourned.

CLARENCE E. SHERWOOD, M.D.,
Secretary.

REPORT OF THE AUDITING COMMITTEE

Honorable Council: The following is a report of the Auditing Committee:

1. All cash taken in checked against deposit slips in bank. This was found to check to the penny.
2. All bills paid checked against cancelled checks from bank. This checked to the penny.
3. The Legislature account checked separately, accounts received checked against bank deposit slips to the penny.

All bills paid checked against cancelled checks which checked perfectly.

Therefore, the Committee found the Secretary's books to be in first-class shape, and all accounts checking perfectly.

The Committee on behalf of the Council wishes to thank the Secretary (Dr. Clarence E. Sherwood), for his careful and complete system of handling the State Society accounts.

Recommendations—

4. Balance of the Legislative Budget to be retained in a special fund.
5. Effort to be made to increase fund by soliciting those who did not pay their \$15.00 share into the legislative fund.
6. That Karl Goldsmith be retained on an annual basis.
7. That the Public Policy and Legislative Committee be more active in counteracting adverse propaganda.

Respectfully submitted,
W. G. MAGEE, M.D.
WILLIAM DUNCAN, M.D.
D. S. BAUGHMAN, M.D.

PROPOSED AMENDMENT

To the Constitution of the South Dakota State Medical Association

Article IX Officers

Section 2 of the Constitution shall be amended to read as follows:

The officers, except the Councilors, shall be elected annually by the House of Delegates. The Councilors shall be elected by the component societies which they represent. The terms of the Councilors and of the Secretary-Treasurer shall be for three years; one third of the members of the Council shall be elected each year. The Secretary-Treasurer shall be elected by the Council. All of these officers shall serve until their successors are elected and installed.

REPORT OF THE COUNCIL

June 17, 1938

The meeting of the Council of the South Dakota State Medical Association was called to order in room 729, Marvin Hughitt Hotel, at 2:15 p. m.

Roll call: The following were present: Drs. J. F. D. Cook, O. J. Mabee, C. E. Sherwood, J. D. Whiteside, W. G. Magee, D. S. Baughman, B. M. Hart, G. E. Burman, J. H. Lloyd, W. E. Donahoe, S. M. Hohf, C. E. Lowe, Wm. Duncan, and E. A. Pittenger. Karl Goldsmith, Pierre attorney, was also present.

Dr. Cook read a letter from H. F. Stevens, Secretary of the Executive Committee of the State Dental Society, inviting our association to meet jointly with them in Aberdeen during May. General discussion was had and the matter tabled for the time being.

Dr. Pittenger moved that the officers of the association be instructed to arrange the program for the 1939 session in such a manner that all the business sessions be out of the way on the first day of the meeting, and that steps be taken at the meeting to amend the by-laws accordingly. Seconded by Dr. Magee and passed after a discussion.

Dr. Cook moved that in order to facilitate the business that all committee reports be in the hands of the secretary thirty days prior to the annual meeting. Seconded by Dr. Pittenger and passed.

The main business of the meeting was next taken up, which was the consideration of the draft of the Basic Science Bill. This was read by Karl Goldsmith, our attorney. There was a general discussion on a number of points. It was moved by Dr. Pittenger that we accept this draft as the one which we would present to the legislature. Seconded by Dr. Hart and passed with two dissenting. Dr. Baughman and Dr. Duncan felt that the composition of the examining board was not as we should desire it.

Dr. Hart made some observations on the conditions.

Dr. Cook moved that the Secretary be instructed to place a copy of this draft of the Basic Science Bill in the hands of the Councilor, Secretary, and President of each district society, and that they be instructed to discuss fully with all the doctors in the district this draft and report, through the councilor, to the secretary of the state association their reactions, together with any suggestions or alterations prior to September 1. This was seconded by Dr. Pittenger and Dr. Mabee. *Passed.*

The matter of the invitation from the State Dental Society was again taken up and was referred to the Aberdeen District Society to recommend to the Council as to whether a joint meeting might be advisable because of hotel accommodations. *It was seconded and passed.*

Telephone bill for Dr. Cook was allowed and ordered paid. There being no further business the meeting was adjourned.

July 13, 1938

After sitting in with the Allied-Council and participating in the discussion of medical relief for the farm security clients the members of the Council convened in a separate room.

Minutes of the previous meeting held on June 17 were read and approved.

Dr. Cook discussed the matter of appointing a committee on industrial health as suggested by the American Medical Association. It was moved by Dr. Pittenger and seconded by Dr. Whiteside, that a committee of five be appointed. (Dr. Cook appointed Drs. R. W. Mullen, R. J. Jackson, and P. P. Ewald.)

The resignation of Dr. S. J. Walters of Winner was read, the reason for his resignation being that he was now practicing in California. It was moved by Dr. Lowe and seconded by Dr. Pittenger that Dr. R. E. Overton be appointed to fill in the unexpired term. *Passed.*

The quota on the special subscription was read by Dr. C. E. Sherwood.

	Members	
District 1	37	\$ 647.50
District 2	22	385.00
District 3	22	385.00
District 4	18	315.00
District 5	15	262.50

District 6	23	402.50
District 7	45	787.50
District 8	40	700.00
District 9	46	805.00
District 10	6	105.00
District 12	12	210.00
		\$5,005.50

It was moved by Dr. Baughman and seconded by Dr. Hart that the quota be accepted and sent to the component societies.

There being no further business the meeting adjourned after an informal discussion of the Basic Science Bill.

September 12, 1938

The Council of the South Dakota State Medical Association convened at the Marvin Hughitt Hotel in Huron, Monday, September 12, at 10:15 a. m. Dr. S. M. Hohf, Chairman, presided.

The following members were present: Drs. J. F. D. Cook, O. J. Mabee, J. C. Shirley, B. A. Dyar, J. R. Westaby, C. E. Sherwood, J. D. Whiteside, W. G. Magee, B. M. Hart, G. E. Burman, J. H. Lloyd, W. E. Donahoe, S. M. Hohf, Wm. Duncan, and E. A. Pittenger. Karl Goldsmith, our attorney, was also present.

Discussion of the Basic Science Bill was had with consideration of the various changes recommended by the District Societies.

Dr. Pittenger moved and Dr. J. R. Westaby seconded that the bill be so changed as to make the examining board five members instead of three. *Motion was carried.*

It was moved by Dr. J. R. Westaby, seconded by Dr. Mabee that the initial registration fee be changed to \$5.00. After a discussion the motion was carried.

It was moved by Dr. J. R. Westaby and seconded by Dr. Pittenger that citizenship in the United States be required to qualify for examination. After a discussion the motion was carried.

Dr. Cook presented literature and publications that had been used in Kansas and Michigan in the passage of the Basic Science Law. It was moved and seconded that the material be given to our attorney, Karl Goldsmith, and that he look it over and make such revisions as necessary for use in South Dakota and that it then be referred to the Basic Science Committee. *Motion passed.*

Dr. A. S. Rider, Flandreau, a member of the Planning Board, was present and explained the projected study of medical care that the Medical Committee of the Planning Board expect to undertake.

Dr. Kraushaar suggested that our committee turn over the material of the American Medical Association survey to this committee and allow them to make the survey for the state association. It was moved and seconded that Dr. Kraushaar be authorized to do this. *Motion carried.*

Council adjourned to the dining room for luncheon. Here the consideration of business was continued.

After a discussion by Dr. Kraushaar, a member of the Allied-Council, and Dr. Dyar, on the F. A. C., it was moved by Dr. Hart and seconded by Dr. Duncan that the plan as outlined be accepted and that the South Dakota State Medical Association cooperate. *Motion carried.*

Dr. Pittenger moved and it was seconded that the secretary be authorized to write the Farmer's Aid Corporation that it is our request that Dr. B. A. Dyar be retained as supervisor in the new set-up. *Motion carried.*

Luncheon being completed the Council re-adjourned to the place of meeting and continued their discussion.

It being necessary for Dr. S. M. Hohf to leave, Dr. J. F. D. Cook presided at the balance of the session.

It was moved and seconded that the Committee on General Arrangements for the next annual session is to be composed of Dr. Cook, Dr. Shirley, and Dr. C. E. Sherwood.

Upon recommendation of the Committee on General Arrangements, Dr. J. L. Calene of Aberdeen was appointed chairman of the Committee on Local Arrangements.

It was moved by Dr. Pittenger and seconded by Dr. Hart that the dates of the next annual session of the South Dakota

State Medical Association be set as the 8th, 9th and 10th of May, 1939. *Motion carried.*

Moved by Dr. Magee and seconded that the matter of arranging for a joint meeting of the Dental Society be referred to the Committee on Local Arrangements. *Carried.*

It was moved by Dr. Mabee and seconded that necessary expenses for programs for the postgraduate courses be paid for out of association funds. *Motion carried.*

Dr. Dyar presented the matter of cooperative radio programs between the State Board of Health and the State Association. It was moved by Dr. Pittenger and seconded by Dr. Westaby that our committee be authorized to cooperate with the State Board of Health in presenting these radio programs.

A general discussion was held to consider the matters to come before the Special Session of the House of Delegates of the American Medical Association. Our delegate was instructed to use his best discretion in voting on the matters.

There being no further business, the meeting adjourned.

November 29, 1938

The Council of the South Dakota State Medical Association convened in the private dining room of the Marvin Hughitt Hotel, in Huron at noon, Tuesday, November 29, 1938.

The meeting was called to order by the chairman, Dr. S. M. Hohf.

The following were present: Drs. J. F. D. Cook, J. C. Shirley, B. A. Dyar, C. E. Sherwood, J. R. Westaby, J. D. Whiteside, W. G. Magee, D. S. Baughman, B. M. Hart, J. H. Lloyd, W. E. Donahoe, S. M. Hohf, Wm. Duncan, and E. A. Pittenger. Dr. J. D. Alway, of the Basic Science Committee, and Dr. J. D. Calene, local chairman in charge of arrangements for the annual session, and our attorney, Karl Goldsmith, were also present.

Minutes of the previous meeting were read and approved.

The secretary reported on the recent refresher course. A general discussion was held as to the value and the desirability of continuing them in the future. Moved by Dr. Donahoe, and seconded by Dr. Duncan that we should arrange similar courses in the future in accordance with funds available. *Motion carried.*

Dr. Duncan moved that the Council send a note of appreciation to the State Board of Health for their cooperation in securing funds which made this work available. *Motion seconded and passed.*

Dr. Cook reported on correspondence he had recently received from the Social Security Board asking that the South Dakota State Medical Association cooperate with the Basic Science Board in working out some plan whereby the needed medical care for Old Age Assistance clients might be budgeted and the physicians receive the money so budgeted. The matter was discussed by Dr. Dyar and other members of the Council. It was moved by Dr. Baughman, and seconded by Dr. Westaby that our Executive Secretary, Dr. Dyar, be designated as the representative of the South Dakota State Medical Association to formulate with the Social Security Board a tentative plan and report back to the Council. *Motion carried.*

Dr. Cook also presented a letter from Dr. Braasch urging the importance and necessity of getting the information as soon as possible from the survey on medical care as formulated and fostered by the American Medical Association. In discussion of this matter he also read correspondence from Dr. Rider, through whom this matter had been delegated to the Planning Board Committee. After a general discussion it was moved by Dr. Pittenger and seconded by Dr. Duncan, that the secretary be instructed to contact Dr. Rider and find out the probabilities of action in this matter in the near future and that the President, President-elect and Secretary be empowered to take whatever action in the matter of making the survey that they should deem proper. *Motion carried.*

The Secretary, in discussing the Basic Science Bill, read letters he had received in response to the appeal for a special legislative fund. A general discussion was had and it was decided that the Secretary should write the District Secretary urging them to raise, as budgeted, and convey the information to them that the money so collected should be handled through the regular Secretary-Treasurer, that the money would be expended in the regular manner only upon authorization by the Council, and that any fund collected in excess of the required amount

for the legislative fund would be prorated back to the District Society.

The publication of the pamphlet to be used in educational work on the Basic Science Bill was discussed and the Secretary was instructed to publish 2000 copies. That they were to be sent to all pharmacists, physicians, and hospital superintendents, and a supply be sent to the District Secretaries with the instructions that they have each member of the legislature contacted and the proposed bill explained to them, and asked that the Secretary report back to the state office the reaction of the legislator.

Dr. Duncan moved and Dr. Lloyd seconded that Karl Goldsmith be designated as the chairman of our lobby and that he be given authority to call on members of the state association at any time for help. *Motion carried.*

After a general discussion of matters pertaining to our legislative campaign with Karl Goldsmith the meeting was adjourned.

January 18, 1939

The Council of the South Dakota State Medical Association held their meeting 12:30 p. m., noon luncheon at the St. Charles Hotel in Pierre, South Dakota.

The following members were present: Drs. J. F. D. Cook, J. C. Shirley, O. J. Mabee, J. D. Whiteside, D. S. Baughman, B. M. Hart, W. E. Donahoe, S. M. Hohf, Wm. Duncan, D. Mills, State Representative of Wahl, S. D., N. T. Owen, member of Board of Health, Attorney Karl Goldsmith, and Miss Knodell, stenographer.

Dr. Cook called the attention of the Council to the matters requested by Secretary Sherwood, relative to the financial special fund, total receipts of \$2250. Also the status of the American Medical Association survey, which is now in the hands of Dr. Kraushaar, Dean Serles cooperating.

Motion by Dr. Cook, and seconded by Dr. Hart, that the Council provide for the expenses of these members to Pierre; that travel be five cents per mile by auto; that the hotel bill be paid, and that the railway expense be paid when train service was used. *Motion carried.*

Attorney Goldsmith discussed the Basic Science Bill and outlined methods of procedure. A committee hearing on House Bill No. 10, was on schedule for 3:30 p. m.

There being no further business, the meeting adjourned.

MISS KNODELL, *Stenographer*

J. F. D. COOK, M.D., *President*

The members of the Council attended the meeting at 3:30 p. m. and were well received. Another meeting of the committee is called for 3:30 p. m. Tuesday, January 24, at which time we are to appear on behalf of the Basic Science Bill.

February 14, 1939

A special meeting of the Council was held in Pierre, Tuesday, February 14, at 2 p. m.

Roll call. Members present were: Drs. Cook, Mabee, Dyar, Sherwood, Westaby, Whiteside, Baughman, Hart, Burman, Donahoe, Hohf, Fleegeer and Duncan. Dr. J. D. Alway took Dr. Pittenger's place. Quorum present.

Minutes of the previous meeting were read and approved.

Dr. Cook introduced Karl Goldsmith, who discussed the Basic Science Bill. It was moved by Dr. Mabee and seconded by Dr. Baughman, that House Bill No. 10, as amended, be approved. *Motion carried.*

Dr. Donahoe discussed the bill which pertains to the examination of food handlers. Dr. Sherwood called attention to the report of the Public Health Committee of the South Dakota State Medical Association pertaining to this matter in the July 1938 issue of the JOURNAL-LANCET.

House Bill 47 was discussed. It was moved by Dr. Donahoe and seconded by Dr. Whiteside that action on this bill be left to the committee to decide. *Motion carried.*

The Secretary reported on the legislative action of the Michigan State Medical Association pertaining to their prepayment plan of hospitalization and medical care.

There being no further discussion of medical subjects, the meeting was adjourned.

C. E. SHERWOOD, M.D.,
Secretary,
South Dakota State Medical Association.

HOUSE OF DELEGATES, SOUTH DAKOTA STATE MEDICAL ASSOCIATION

First Meeting

Aberdeen, South Dakota, April 24, 1939

The first meeting of the House of Delegates was held at 2:00 p. m. at the Alonzo Ward Hotel, April 24, 1939. President-elect Dr. J. D. Shirley presided, Dr. C. E. Sherwood, Secretary.

Roll Call: Drs. J. C. Shirley, C. E. Sherwood, B. A. Dyar, J. R. Westaby, J. D. Whiteside, W. G. Magee, D. S. Baughman, B. M. Hart, J. H. Lloyd, W. E. Donahoe, S. M. Hohf, R. B. Fleegeer, C. E. Lowe, Wm. Duncan, E. A. Pittenger, E. A. Rudolph, J. E. Bruner, H. R. Brown, G. E. Whitson, T. F. Riggs, E. W. Jones, L. J. Pankow, F. W. Haas, G. W. Mills, J. E. Curtis, Faris Pfister, J. C. Ohlmacher. Quorum present.

President-elect Dr. J. C. Shirley appointed the following reference committees: Reports of Officers: Drs. Lloyd, Lowe and Bruner. Resolutions and Memorials: Drs. Fleegeer, Hohf, Riggs. Amendments to the Constitution and By-Laws: Drs. Pfister, Howe, Pankow, Ball, Riggs, Burman, Haas, Lowe, Curtis, Duncan, Pankow and Whitson. Credentials: Drs. Ohlmacher, Fleegeer, Duncan.

The Secretary presented the minutes of the 1938 meeting as printed in the July 1938 issue of the JOURNAL-LANCET. Dr. Pankow moved that the House of Delegates accept the report as printed in the JOURNAL-LANCET. *Motion seconded and passed.*

The report of the Secretary-Treasurer was read by Dr. C. E. Sherwood and presented to the proper committee for approval.

Dr. Westaby moved that the Secretary be allowed to send a wire to Dr. O. J. Mabee offering the good wishes of the House of Delegates for his speedy recovery from pneumonia. *Motion seconded and passed.*

In the absence of Dr. Cook, President of the State Medical Association, Dr. Sherwood read his address. It was moved by Dr. Pankow and seconded that this address and report of the President be referred to the proper committee. *Motion carried.*

Dr. J. R. Westaby presented his report as 1938 delegate to the American Medical Association. Referred to Reference Committee.

The reports of the Standing and Special Committees were given:

Committee on Scientific Work submitted program as its report.

Committee on Public Policy. Report contained in Dr. Cook's address. Referred to proper committee.

Committee on Publications. The Secretary reported that the JOURNAL-LANCET was designated as the official publication of the South Dakota State Medical Association for a period of five years at the meeting of the South Dakota State Medical Association in 1938. The Council in their first meeting entered into a new financial agreement with a representative of the JOURNAL-LANCET. For the coming year the price of the JOURNAL-LANCET will be \$1.75 and each year thereafter \$2.00.

Committee on Medical Defense. No report of malpractice suits.

Medical Education and Hospitals Committee. No report.

Committee on Medical Economics. Report presented by Dr. Kraushaar. Referred to Reference Committee.

Committee on Public Health. Report read by the Secretary and referred to Reference Committee.

Committee on Necrology. The report of deceased members was read by the Secretary and referred to proper committee.

Committee on Spafford Memorial Fund. Report given by Dr. Ohlmacher and referred to proper committee.

Committee on Syphilis Control. No report.

Committee on Radio Broadcasts. Submitted by Dr. Hohf. Referred to proper committee.

Editorial Committee. No report.

Basic Science Committee. This report was read by the Secretary and referred to proper committee. A discussion was held concerning the matter of referring the two laws passed at the recent session of the legislature pertaining to blood tests on pregnant women and blood tests for applicants for a marriage license. It was moved by Dr. Pittenger and seconded by

Dr. Pankow that it is the consensus of this meeting assembled that we are in favor of the bills as they were passed by the legislature and that a committee be appointed to draw up a resolution to that effect to be given to the Associated Press. Motion carried.

Committee on Medical Licensure. Report read and referred to proper committee. A discussion was held concerning the licensing of foreign graduates in this state.

Committee on Woman's Auxiliary. No report.

Committee on Military Affairs. No report.

Committee on Radiology. Report read by the Secretary. Referred to proper committee.

Committee on Postgraduate Course. Report given by Dr. Ohlmacher and referred to proper committee.

Committee on Orthopedics. Report was read by the Secretary and referred to proper committee.

Committee on Social Security. No report.

Committee on Ophthalmology and Otolaryngology. Report read by the Secretary. Report referred to proper committee.

Old Business. None.

New Business. The matter of fees for Wassermans in conjunction with recent legislation was discussed. It was moved by Dr. Duncan and seconded that a recommendation be made to the doctors of the State that a charge of not more than \$2 be made for taking blood for a Wassermann necessary in the issuance of marriage licenses. Motion passed.

Dr. Pittenger moved that Dr. J. D. Alway be named as a candidate for the Basic Science Board. Motion seconded by Dr. Duncan. Carried.

Dr. Mills nominated the name of Dr. J. C. Ohlmacher as a candidate to serve on this same board. Motion seconded and passed. Further action on this matter was deferred until the next meeting of the House of Delegates.

Matter of appropriation for the construction of a new building for the Army Medical Library and Museum at Washington was referred to the Committee on Resolutions and Memorials.

It was moved by Dr. Whitson and seconded that the name of Dr. Scanlon be placed on the honor roll of the State Medical Association. Motion passed.

The matter of amending the constitution and by-laws was presented by Dr. Pfister. Further information concerning this subject was explained by Dr. Pankow. These amendments will be reported back to the House of Delegates at the next meeting.

Dr. Hohf moved that Dr. C. M. Keeling of Springfield be elected an honorary member of the State Medical Association. Motion seconded and passed.

Report of the Inter-Allied Council was given by Dr. Hopkins. Referred to proper committee.

A telegram was read from the county commissioners in Edmunds county concerning the financial situation in that county as it applies to medical relief.

The meeting adjourned.

CLARENCE E. SHERWOOD, M.D.,
Secretary.

Second Meeting of the House of Delegates

April 24, 1939

The second meeting of the House of Delegates was held at 8:30 p. m. April 24, 1939, at the Alonzo Ward Hotel, Dr. Shirley presiding. Dr. C. E. Sherwood, Secretary.

Roll Call: Drs. J. C. Shirley, C. E. Sherwood, B. A. Dyar, J. R. Westaby, J. D. Whiteside, W. G. Magee, D. S. Baughman, B. M. Hart, J. H. Lloyd, W. E. Donahoe, S. M. Hohf, R. B. Fleeger, C. E. Lowe, Wm. Duncan, E. A. Pittenger, E. A. Rudolph, J. E. Bruner, H. R. Brown, G. E. Whitson, T. F. Riggs, E. W. Jones, L. J. Pankow, F. W. Haas, J. C. Ohlmacher, G. W. Mills, F. S. Howe, J. E. Curtis, Faris Pfister. Quorum present.

The minutes of the previous meeting were read by the Secretary and approved as read.

The report of the Committee on Nominations and Place of Meeting was given by Dr. Jones. The following were nominated for President-elect: Drs. O. J. Mabee and J. F. D. Cook; for Vice-President, Drs. B. M. Hart and T. F. Riggs; for Councilors, Dr. D. S. Baughman, Madison District, Dr.

G. E. Burman, Huron District; Dr. J. H. Lloyd, Mitchell District, and Dr. W. E. Donahoe, Sioux Falls District. Place of Meeting, Watertown and Sioux Falls.

It was moved and seconded that this report be accepted. A supplementary motion was made by Dr. Riggs that the Council accept the resignation of Dr. B. M. Hart as Councilor from the 4th District and the name of Dr. C. E. Robbins be nominated to fill the unexpired term of Dr. Hart. Motion seconded and passed. There being no further nominations, balloting was completed with the following results:

President-elect, Dr. O. J. Mabee.

Vice-President, Dr. B. M. Hart.

Councilor, Madison District, Dr. D. S. Baughman.

Councilor, Huron District, Dr. G. E. Burman.

Councilor, Mitchell District, Dr. J. H. Lloyd.

Councilor, Sioux Falls District, Dr. W. E. Donahoe.

Councilor, Pierre District, Dr. C. E. Robbins.

Place of Meeting, Watertown.

The President-elect delivered a short address.

The report of the Reference Committee on Reports of Officers was given by Dr. Lloyd. Dr. Pfister moved and Dr. Whitson seconded a motion to adopt this report as read. Motion passed.

The report of the Reference Committee on Resolutions and Memorials was presented by Dr. Fleeger as follows: "Your committee recommends that the communication from the American Medical Association relative to the Army Medical Library and Museum to be taken care of by the President of the Association appointing a committee as requested. It is resolved that the South Dakota Medical Association is heartily in favor with all the aims and efforts of the Inter-Allied Council and assure our cooperation. We recommend that the report of the standing and special committees including Orthopedics, Postgraduate, Radiology, Medical Licensure, Basic Science, Broadcasting, Spafford Memorial, Necrology, Public Health, and Medical Defense be accepted and placed on file. With reference to the Postgraduate Course, your committee recommends that this important course be continued. If funds from the State Board of Health be available, that they be continued to be used for this purpose. Your committee is heartily in accord with the recommendation embodied in the report of the Committee on Medical Licensure, with reference to the qualifications of candidates for licensure. Your committee recommends that a vote of thanks from the Association be extended to Attorney Goldsmith for the commendable service which he rendered in behalf of the Association during the recent legislative session." It was moved by Dr. Howe and seconded that the report be adopted. Passed.

Report of Committee on Amendments and By-Laws was presented by Dr. Pfister. Dr. Pfister presented new changes to the constitution; Dr. Pankow presented new changes to the by-laws with the recommendation that amendments to the constitution be placed on file for a period of a year, to be voted upon at the next State meeting. The by-laws must lie on the table for 24 hours before being voted upon.

There was no old business to be taken up.

New Business. The matter of dues for the coming year was discussed briefly. It was moved by Dr. Whitson and seconded by Dr. Howe that the dues for the coming year remain \$10.00. Motion carried.

The matter of selecting nominees for the non-professional member to act on the Basic Science Board to be recommended to the Governor was next presented. Dr. Hohf nominated the names of Dr. H. Morrow Sweeney and Dr. William H. Waller of the University of South Dakota. Dr. Hopkins nominated J. L. Taylor of State College. It was moved by Dr. Pittenger that the Association submit the names of all three to the Governor for his action and appointment. Motion seconded and passed.

The Secretary explained the matter of redistricting the medical societies of the state. Dr. Whitson moved and Dr. Rudolph seconded a motion that the matter be accepted as presented. Motion carried.

The Secretary called attention to the American Congress on Obstetrics and Gynecology to be held at Cleveland, Ohio, September 11 to 15, 1939.

The matter of continuation of the Farmers Aid Corporation was next taken up. Each Councilor expressed the views of the doctors in his District toward the present medical aid program. The Farmers Aid Corporation program was discussed by the Councilors and Delegates.

Dr. Pankow moved that this organization go on record as not favoring the setup of the present FAC program. *Motion seconded and carried.*

Dr. Howe moved that it be the sense of this meeting that a committee be empowered to draw up a plan for submission to the Council for the care of the needy active grant cases. Motion was seconded by Dr. Riggs and passed. A supplementary motion was made wherein this committee be authorized to cooperate with the Inter-Allied Council. *Seconded and passed.*

Dr. Shirley appointed the following doctors to act on this committee: Drs. Hopkins, Kraushaar, Riggs, with Dr. Dyar as ex-officio member.

Meeting adjourned.

CLARENCE E. SHERWOOD, M.D.,
Secretary.

Third Meeting of the House of Delegates

April 25, 1939

The third meeting of the House of Delegates, which was an adjourned meeting, was held at 5:00 p. m., Tuesday, April 25, 1939, Dr. J. C. Shirley presiding. Dr. C. E. Sherwood, Secretary.

Roll Call: Drs. J. C. Shirley, C. E. Sherwood, J. D. Whiteside, W. G. Magee, J. E. Bruner, H. R. Brown, D. S. Baughman, G. E. Whitson, J. H. Lloyd, E. W. Jones, L. J. Pankow, Paul Billingsley, S. M. Hohf, F. W. Haas, J. C. Ohlmacher, R. B. Fleeger, F. S. Howe, G. W. Mills, C. E. Lowe, J. E. Curtis, Wm. Duncan, Faris Pfister, E. A. Pittenger. Quorum present.

The purpose of the meeting was to vote on the amendments to the by-laws.

Dr. Pankow moved that Dr. Billingsley be permitted to act as a delegate from the Sioux Falls District in the absence of the regular delegate. Motion seconded by Dr. Duncan and passed.

Dr. Pfister moved that Chapter III, House of Delegates, Section 2, be amended to read as follows: "Each component society shall be entitled, each year, to send one delegate or one corresponding alternate to the House of Delegates for each twenty-five full-paid memberships or fraction thereof in this Association as shown by the records of the Association at the close of the previous fiscal year, provided however, that each component society shall be entitled to at least one delegate or one corresponding alternate, be adopted." *Motion seconded.*

The delegates voted as follows: *Yea*, Drs. Brown, Pankow, Ohlmacher, Duncan, Pfister; *Nay*, Whiteside, Magee, Baughman, Whitson, Lloyd, Jones, Hohf, Haas, Fleeger, Howe, Mills, Lowe, Curtis and Pittenger. Dr. Bruner was absent when this vote was taken and Dr. Billingsley passed because he was not familiar with the amendment. *Amendment lost.*

Dr. Pankow moved that Section 10, to be added to Chapter III, House of Delegates, as follows: "Each component society shall be entitled to cast a number of votes equal to the number of delegates to which it is entitled according to the terms of these by-laws, and on election of officers, all questions of policy of the Association, finances of the Association, changes in the constitution and by-laws of the Association and all matters other than the ordinary routine of business and procedure, all balloting shall be by roll call of the component societies. The ballot result shall become a part of the permanent records of the Association," be adopted. Motion seconded by Dr. Pfister.

The delegates voted as follows: *Yea*, Drs. Brown, Lloyd, Pankow, Billingsley, Pfister; *Nay*, Whiteside, Magee, Bruner, Baughman, Whitson, Jones, Hohf, Haas, Ohlmacher, Fleeger, Howe, Mills, Lowe, Curtis, Duncan, Pittenger. *Amendment lost.*

Dr. Pankow moved that the following amendment to the amendment to Chapter VIII, Dues and Assessments, Section 1 as follows: "The last sentence be amended to read 'December

31' instead of 'March 1', as at present, and the final period of this section shall be changed to a semicolon and the following added: 'Provided said member shall have been a member in good standing in this Association for a period of not less than two consecutive years immediately prior to the current year,' be changed to read as follows: That the words 'December 31' be stricken and the words 'July 1' be substituted." Motion seconded by Dr. Baughman.

A roll call vote was taken with the delegates voting on the amendment to the amendment as follows: *Yea*, Drs. Whiteside, Magee, Brown, Baughman, Whitson, Pankow, Billingsley, Ohlmacher, Mills, Duncan, Pfister. *Nay*, Drs. Bruner, Lloyd, Jones, Hohf, Haas, Fleeger, Howe, Lowe, Curtis, Pittenger. *Amendment to the amendment carried.*

Dr. Pankow moved the adoption of this amendment to the by-laws. Motion seconded.

The delegates voted on the amendment as follows: *Yea*, Drs. Bruner, Brown, Pankow, Billingsley, Ohlmacher, Duncan, Pfister; *Nay*, Whiteside, Magee, Baughman, Whitson, Lloyd, Jones, Hohf, Haas, Fleeger, Howe, Mills, Lowe, Curtis, Pittenger. *Amendment lost.*

There being no further business, the meeting adjourned.

CLARENCE E. SHERWOOD, M.D.,
Secretary.

REPORT OF COMMITTEE ON OPHTHALMOLOGY AND OTOLARYNGOLOGY (Advisory to State Departments)

The South Dakota Academy have taken action restricting examiners for the Social Security Aid to the Blind to be given by members of our Academy only. Our members gave all the support they could to any of the bills which represented the legislation in this session and were quite active in the support of the program.

Respectfully submitted,
JOHN GREGG, M.D.
H. L. SAYLOR, M.D.

REPORT OF THE PUBLIC HEALTH COMMITTEE

Your committee has continued its practice of cooperating with the other agencies in the State which are doing Public Health work. The sub-committee on Child Welfare and Mental Hygiene continues its cooperation with lay groups but has no specific report to make at this time.

The cancer sub-committee begs to report that their activities this year have been limited to various papers and discussions of cancer before medical societies and lay groups. The cancer study has been overshadowed in the state during the past year by the medical profession in their fight for control of syphilis and pneumonia. However, your committee still considers that the cancer problem is most urgent, being second among the leading causes of death and being estimated that one of ten who reach the age of twenty-five is destined to die of cancer. In South Dakota we have an average death rate from cancer of nearly six hundred annually. Your committee therefore recommends that intensive study of cancer be undertaken by the Public Health committee during 1939, stressing reliable information for the public as to early diagnosis of cancer and frequent health examinations.

Tuberculosis continues to take its toll in South Dakota. The greatest cause for these deaths is the fact that the disease is still found only in advanced stages. There are doctors in South Dakota who have awakened to their responsibility to the tuberculous of the state. Evidence of this is seen by the admitting to the Sanatorium from those areas, of early and even questionable cases of infection. This is the only way we may get ahead of the disease. There are other areas from which only far advanced terminal cases are sent to the Sanatorium. In those areas, I feel, should be concentrated efforts at early diagnosis campaigns. This education is needed by us as physicians as well as by the general public. The state Tuberculosis Association has always cooperated with the doctors of the state. Their job is educational, their literature worthwhile.

The Sanatorium at Sanator feels it an obligation to assist the physicians in any way possible. Its physicians gave their

opinion on 500 chest films the past year and have examined many chests in consultation. More and more cases with collapse will be dismissed from the Sanatorium and the state has not enough trained physicians to continue this. It is imperative that there be physicians trained to do this work. There is a standing invitation for any physician in the state to spend as much time as desired at the State Sanatorium.

The legislature has seen fit to cut the budget of the Sanatorium, thus hampering its progress. It was hoped that a surgical department might be added. The physicians of the state should insist that this be done as an advance in scientific care of the tuberculous in South Dakota.

The tuberculosis committee further recommends that a better system of case reporting and follow-up be established in the state of South Dakota. At the present time no definite attempt is made to check on all public contacts with a known case of tuberculosis, nor is there any following up of those cases which are arrested and sent home from the Sanatorium.

We feel that in order to have an adequate program in the state both these things are essential and should be part of the state tuberculosis program.

These things we recommend so that they may be urged upon the legislative body at the next session.

J. VINCENT SHERWOOD, M.D.,
Chairman.

REPORT OF COMMITTEE ON MEDICAL LICENSURE

To the President and Members of the South Dakota Medical Association: Your committee on Medical Licensure beg to make the following report: The work of this committee has been advisory in nature providing so far as possible moral backing to the Director of Medical Licensure, following out the regulations of the State Board of Health in so much as they applied to Medical Licensure.

The question of licensing foreign applicants came up for consideration before the State Board, on account of the application of a foreign applicant for license in South Dakota. Your committee recommended that first, the applicant must be a citizen of the United States, second, he must, if graduated from a foreign school, have graduated from some school whose standards correspond with our Class A medical schools. In so much as we have no exact classification for foreign schools this may be a rather difficult question for the State Board to decide upon.

In general the view taken and advised by your committee was adopted by the State Board of Health. We believe that this has been made a permanent policy by the State Board. In as much as conditions are such as we may have many foreign applications in the State, it is very important to this Association and the Medical profession of the State.

Your committee has at all times cooperated with and given such backing as was necessary to the Director of Medical Licensure in carrying out the laws and regulations of the State Board of Health relating to Medical Licensure. We wish to express our appreciation for the fine cooperation that we have had from Dr. Dyar, the retiring Director of Medical Licensure. We feel sure that we will have the same splendid cooperation from the new Director, Dr. Van Heuvelen.

While the duties of this committee are not heavy we feel that it is imperative that we have the closest cooperation between your committee and the Director of Medical Licensure.

F. S. HOWE, M.D.
MERRILL W. PANGBURN, M.D.
J. D. WHITESIDE, M.D.

REPORT OF COMMITTEE ON INTER-ALLIED RELATIONS

To the Officers and House of Delegates of the South Dakota Medical Association: Your committee on the Inter-Allied Relations wishes to submit the following report.

The Inter-Allied Professional Association has been in existence now for five years. During that time some of the sections of the state have been organized into districts but not the whole state. It is hoped that sometime we will be able to report the

completion of this organization. This however is not the most important feature of the activities of this organization. The active part of the organization consists of the Inter-Allied Council consisting of two members from each of the State Associations of the Pharmacists, Dentists, Nurses, Hospitals and Physicians. During the past year the Council has held two meetings, one at Huron and one at Aberdeen.

What has this accomplished? First it has brought the various professional associations closer together than any other one thing or dozen things that have ever been attempted before. The various professions now understand each other better than ever before. Second, this unity of the professions made it possible for the medical association to pass a Basic Science law at the last session of the legislature which would have been almost an utter impossibility had the medical men attempted the passage alone. In other matters of legislation the unity of the professions was just as important.

All the various features of Inter-Allied activities have not been perfect but the Council has tried its best to benefit the state as a whole. The one thing that has been mostly in mind and prominent in thought is the success or failure of the FAC. We acknowledge that it is a bone of contention and a matter that needs very careful consideration; one that must not be decided on definitely on the spur of the moment. On Sunday night the Inter-Allied Council met with a 100 per cent attendance and discussed this matter very fully and will submit to each of the associations a proposal for the continuation of the FAC with several modifications from the present set-up.

B. A. DYAR, M.D.
J. O. F. KRAUSHAAR, M.D.
N. K. HOPKINS, M.D.

REPORT OF COMMITTEE ON THE SPAFFORD MEMORIAL FUND FOR A SCHOLARSHIP AT THE UNIVERSITY OF SOUTH DAKOTA

The following report is respectfully reported by your committee.

The younger members of this Association may not be aware just what the nature of this endowment consists of and so we are taking the liberty of reiterating its provisions. In University parlance this is cited as follows: "The Dr. Frederick Angier Spafford Memorial Prize is awarded each year to that student who, in the opinion of the committee, has made the most satisfactory progress in the study of Latin, preferably Virgil. This prize was established by the South Dakota State Medical Association and other friends of Dr. Spafford in recognition of his many years of service as a member of the State Board of Regents of Education and especially of his interest in the study of the ancient classics. Amount, \$25.00."

This fund was placed in the hands of the treasurer of the scholarship funds of the University of South Dakota. It was loaned to a neighboring farmer along with a similar fund from the University, and a first mortgage taken on his property.

For the first three years after the loan was made the interest, consisting of \$60, was allotted to the following students: 1929—Mamie Wara, Madison; 1930—Dorothy Cole, Madison; 1931—Agnes Schmidt, Castlewood. Then there came a period of four years when no money was derived from this fund, the mortgagee being unable to pay the interest. The record of scholarships awarded during this time is as follows: 1932—Ernie Lovejoy, Vermillion, no money available; 1933—Ruth Waggoner, Phillip, no funds; 1934—Marion Schmidt, Castlewood, no funds; 1935—not awarded. For the past three years the scholarship has been awarded and a prize of \$25 given to each recipient, the money being appropriated from another fund. In 1936 it was awarded to Louise Breckerbaumer, Sioux City, Iowa; 1937—Maude Adams, Jefferson; and 1938—Emma Wiken, Volin. In all but one instance the award was made to a resident of South Dakota.

I am assured that the scholarship will continue and if possible, a cash prize granted. The property acquired by this transaction is valuable and if sold it should bring a good price. The \$1000 will then be made available.

(Signed) J. C. OHLMACHER, M.D., *Chairman.*

April 24, 1939.

REPORT OF COMMITTEE ON POSTGRADUATE COURSE

The committee respectfully submits this brief report covering activities for the last year.

Most active in shaping the program was Dr. C. E. Sherwood, secretary of the State Medical Association. To him our gratitude is extended.

Several meetings of the committee with Dr. Sherwood were held at Huron. The program was finally adopted. This program was as follows: 9:00 A. M.—Viola Russell, M.D., Director Division of Maternal and Child Health, Pierre; 9:30 A. M.—R. J. Moe, M.D., Duluth Clinic, Minnesota: Toxemias of Pregnancy; 10:45 A. M.—A. V. Stoesser, M.D., Associate Professor of Pediatrics, University of Minnesota: The Management and Feeding of the Infant from Birth to Six Months of Age.

Immediately after lunch Dr. G. J. Van Huevelen, Venereal Disease Control Officer of the State Board of Health, talked on "The Physician's Responsibility to the Syphilitic Patient." This was followed by interesting and instructive illustrated talks by Drs. Moe and Stoesser. Dr. Moe presented the subjects, "Accidents of Pregnancy and Labor" and Dr. Stoesser the subject, "The Specific Infections or Contagions of Early Childhood with Reference to Specific Diagnostic Tests, Prophylaxis, and Therapeutic Procedures."

This program was given on four consecutive days at Aberdeen, Sioux Falls, Huron, and Rapid City. The local chairman of each district was: Dr. J. E. Bruner, Aberdeen; Dr. W. E. Donahoe, Sioux Falls; Dr. J. E. Shirley, Huron, and Dr. R. E. Earnstrom, Rapid City. The number of physicians attending the meeting in each district was as follows: Aberdeen, 25; Sioux Falls, 60; Huron, 15, and Rapid City, 13. In addition a very considerable number of nurses from neighboring hospitals, and others interested in child welfare, attended.

It will be noted that by far the best attendance was at Sioux Falls. We have reason to believe that this was largely the result of enthusiastic, whole-hearted cooperation of Dr. W. E. Donahoe, chairman. He is to be congratulated.

The total expense of this program was \$373.16, all of which was provided from a special fund at the disposal of the State Board of Health.

A few physicians in each district verbally expressed themselves as well pleased with the program. Only one wrote and offered any comment. One of the out-of-state men appearing on the program suggested that it would be better to hold these meetings in the afternoon, followed by a banquet and then continue with the balance of the program in the evening. This appears to be an excellent suggestion and no doubt your committee will be influenced by it in formulating their next program.

Just how we shall finance the next program is not certain. The State Medical Association has no funds for this purpose. We have been told, however, that the State Board of Health has a fund, part of which may be used for this purpose.

We believe that the postgraduate medical program should be continued and extended. We cannot hope to put on the ambitious program carried on in some states more fortunately situated than we in South Dakota. God and the weatherman being willing, the South Dakota doctors may yet be able to finance these programs. Speed the day.

(Signed) J. C. OHLMACHER, M.D., *Chairman*.
B. A. DYAR, M.D.

REPORT OF BASIC SCIENCE COMMITTEE

House Bill 10—The Basic Science Law, passed, has been signed by the Governor, and will become a law July 1, 1939. There were several amendments made in the bill, of which you have all been heretofore advised. This committee thinks that this bill is an excellent one and in the future will prove a great help to the medical profession. The committee wishes to stress that the council use great care in their selection of our member of the board.

A resume of other bills particularly affecting the medical profession follows:

Senate Bill 218—The Chiropractors bill was amended so that the chiropractors will have to take the Basic Science

examination under the new Basic Science Board; will not be permitted to practice obstetrics or treat communicable diseases, and must be graduates of an approved school for a four year term instead of three years; must be graduates of high school instead of having a high school education or its equivalent, and must confine themselves to the practice of chiropractic, which is defined, "to be the science of locating and removing the cause of any abnormal transmission of nerve energy including diagnostic and externally applied mechanical measures incident thereto."

House Bill 24—which permitted the osteopaths to do surgery passed the house but was defeated in the senate.

House Bill 47—which permits chiropractors and osteopaths to participate in the distribution of public funds, after being amended so it does not apply to the Crippled Children's program, passed the house and senate. A representative of the Federal Crippled Children's Bureau was present at Pierre and said that such amendment would take care of any Federal Public Health Program.

House Bill 92—the chiropractors Basic Science Law, died in Committee. This bill set up a separate board for the examination and licensing of chiropractors on the basic sciences.

In all, the committee feels the Medical Society did a wonderful job, but instead of resting on our oars now is the time to be alert and cash in on our success.

The work of Karl Goldsmith was outstanding and we don't think we could get a better man to uphold our interests. The committee therefore strongly recommends that he be retained on a yearly basis to police infringements against the above laws and also to combat future antagonistic legislation.

Dr. Mills, who is a member of the house, was also a great assistance and if it had not been for his support we probably would not have been as successful as we were. He should be commended by this group for his efforts.

J. D. ALWAY, M.D., *Chairman*.

REPORT OF COMMITTEE ON ORTHOPEDICS

April 18, 1939

The crippled children's program of this State since its inception has been mainly under the supervision of the State Board of Health. Prior to the passage of the Federal Social Security law the work was very limited, due to inadequate funds, not more than \$5000 being available for any one year. With the passage of the Social Security law \$35,000 of matched money was available. The State elected to use only \$25,000 so \$50,000 the past two years has been available for the care of crippled children for the fiscal years 1938 and 1939. This was budgeted as follows, compiled and submitted by Dr. R. H. Wilcox who was in charge of the crippled children program at that time:

\$20,000 for hospitalization of crippled children.
\$2,500 for care of crippled children in convalescent wards.
\$3,500 for leg braces, body braces, artificial limbs, etc.
\$6,600 for nursing care in homes. Case finding and travel incident thereto, including nurses salaries.
\$8,330 for surgeon's fees.
\$1,500 for transporting crippled children and their guardian.
\$1,470 for social service and salary for social service worker.

For Administrative Expense:

\$3,000 Director's salary.
\$900 Director's travel.
\$1,200 Stenographer's salary.
\$300 out of state travel—generally rebudgeted in last quarter of fiscal year to hospitalization.
\$200 office supplies.
\$250 office equipment.
\$250 Communication.

During the first half of the fiscal year for which the above budget is set up 101 children were hospitalized for a total of 2,526 days or an average of 25 days each.

While the care of the cripple in this State is under the supervision of the State Board of Health, like all other Federal projects, it is directed from Washington, and certain re-

quirements are made as to the qualifications for the doctors who are doing this class of work, and also certain qualifications for hospital facilities. Patients have been, as far as possible, taken care of within the State, though Sioux City, Omaha, Rochester, and the Twin Cities have cared for some. Usually these are the more difficult plastic cases. I am told there are about 1000 crippled children in the State. About one-third of these have had no treatment. While there is much to be desired in the management of this work, a good start has been made. One of the handicaps that is encountered is the frequent change of personnel in the administrative office, due in part, at least, to the fact that the Superintendent of the State Board of Health is under the direct control of the incumbent Governor, is an appointive office, and is frequently changed by a new Governor, or necessary changes have to be made in the personnel to suit the particular political party that is in power. It would be very helpful to all concerned if the Superintendent of the State Board of Health and his associates could be under Civil Service or some supervision so that they would not be subject to the whims of every new executive.

GUY E. VAN DEMARK, M.D., *Chairman.*

REPORT OF COMMITTEE ON MEDICAL ECONOMICS

The principal work of the Committee on Medical Economics during the past year had been the work on the survey of the need and supply of medical care as initiated by the American Medical Association.

Plans were made and blanks were about ready to be mailed out by the committee when members of the Planning Board called attention to the fact that they were planning a somewhat similar survey and a suggestion was made that we combine this survey and allow the clerical forces of the Planning Board to do the actual labor in making the survey and computing the data.

Here the matter rested for a time until it was found, late in the year, that it would be some time before the Planning Board survey could get under way, and in as much as the American Medical Association desired the returns by the time Congress convened, the matter was again taken up by the committee and blanks were sent out. This was done very hurriedly and there was very little response from the forms sent out. The following table will show the number of forms sent and the number returned.

	Number Sent	Number Returned and Used in Study
Physicians and Dentists	400	
Physicians		41
Dentists		8
Hospitals	30	10
Nurses	40	2
Health Departments	20	1
Welfare and Relief	40	1
Schools	285	
Colleges	10	4
Other Organizations	5	
Pharmacists	300	16

The original forms were then sent to the Bureau of Medical Economics and they prepared a preliminary report from the incomplete returns. Because of their incompleteness they have very little value statistically, but probably show a trend.

It would seem that as far as acute illness is concerned, people of South Dakota are being taken care of by the physicians to a large extent at little or no fees from the lower income groups.

There are, undoubtedly, a large number of chronic conditions that need care but are not receiving it.

It would seem that the principal difficulty is the lack of income for a large part of the population in the state.

A large part of the report is taken up with comments obtained from the returns on the unsatisfactory features of the Farmers Aid Corporation set-up due, in large part, to the insufficient funds and lack of understanding of what the program is designed to cover.

From the returns it would seem that the need and lack of supply of medical care to a large extent was a matter of economics and that some provision for adequate income to a large

group of families would for most part take care of the discrepancy between the need and supply of medical care.

Considerable more study will be needed to work out satisfactory plans along this line.

REPORT OF COMMITTEE ON RADIOLOGY

The Committee on Radiology is sorry to announce the death of one of its members during the last year, Dr. A. A. McLaurin of Pierre. Dr. McLaurin was always very much interested in the specialty of Radiology and was the one who initiated the round table discussion of Roentgenological interpretation held at our state meetings, which has proven so popular during the last few years.

The Committee urges that the secretary of our association designate a period on the program during the first regular day of our annual meetings, from 4:00 to 5:00 P. M., when interested members may bring their diagnostic film problems for demonstration and consultation to be conducted by someone interested in radiology, visiting or local.

The Committee also urges that all State component societies comply with the desire of the American Society for Control of Cancer to the extent that one of their meetings during the year be devoted to the study and treatment of cancer.

Respectfully submitted,

N. J. NESSA, M.D.
J. L. CALENE, M.D.

REPORT OF COMMITTEE ON BROADCASTING

Please be advised that the Broadcasting Committee is awaiting material to be put on the air. When papers are received from the various members of the State Association, your committee will be ready to function.

Verbal reports have been made, since the end of the broadcasting period in 1936, that broadcasting selected material for the information of the public was of very great value and that it should be continued. Your committee is still of the same opinion.

Very truly yours,
S. M. HOHF, M.D.

REPORT OF COMMITTEE ON NECROLOGY

In submitting the Necrology Report for the past year, we feel it only fitting and proper to pause a moment in our deliberation as a tribute to those gone before. Most of these men were the country doctor type who battled snowdrifts in long forgotten days and sat through many a midnight hour with illness and death as companions. We feel that this unselfish heroism through many years should not pass unrecognized.

We desire to submit the following names: (As nearly as we can find, this list is complete and correct.)

*T. H. BAER, M.D. — Age 64. Born 1874. Graduated University of Iowa, 1902. Practiced in Timber Lake since 1910. Died in Mobridge, July 25, 1938.

*A. E. BROWN, M.D. — Age 75. Born 1863. Practiced in Webster for many years. Died August 4, 1938.

ANDREW HAYDEN, M.D. — Age 75. Born 1862. Practiced in Alcester many years. Died August 21, 1938.

*ROBERT HILL, M.D. — Age 73. Born 1865. Practiced 42 years in Ipswich. Died October 23, 1938.

*ARCHIBALD A. McLAURIN, M.D., F.A.C.S. — Age 62. Born 1876. Practiced for many years in Pierre. Died January 5, 1939.

*GEORGE W. POTTER, M.D. — Age 64. Born 1874. Lived and practiced in Redfield for many years. Died February 15, 1939.

E. V. BOBB, M.D. — Age 64. Former Mitchell, South Dakota resident, died at his home in Alhambra, California, March 4, 1939. Began practicing medicine in South Dakota in 1899. From 1920 to 1924 was Mayor of Mitchell.

*DANIEL L. SCANLAN, M.D. — Age 67. Volga, South Dakota. Dr. Scanlan was president of the South Dakota State Medical Association in 1919 and active in its work for more than 30 years. Died March 3, 1939.

Respectfully submitted,

W. H. SAXTON, M.D., *Chairman.*
R. J. QUINN, M.D.
A. O. CARMACK, M.D.

*Member of South Dakota State Medical Association.

REPORT OF DR. J. R. WESTABY
 Delegate to the American Medical Association
 San Francisco Session, 1938

Mr. President, Members of the House of Delegates, Council and Friends.

It is my pleasure at this time to bring to you a short review of the work of the House of Delegates of the American Medical Association in session at San Francisco June 13th to 17th, 1938. All sessions were held in the Empire Room of the Sir Francis Drake Hotel and were held as scheduled, Speaker Dr. N. B. Van Etten presiding.

In addressing the members of the House of Delegates the speaker stated that the American Medical Association was created for the protection of the public from the misrepresentations of Charlatans and Quacks; for the promotion of Science and Art of Medicine, and for the betterment of the public health. Any member of this House had the right to express his views on any subject with the greatest freedom, as delegates you represent your state society and we are glad to have your opinion and council. On your shoulders rests the fate of American Medicine. There are no dictators among the 175 delegates at this meeting and every practitioner of medicine looks to you for guidance and advice. If the American Medical Association is a blundering elephant remember you are riding him.

In the address of the President, Dr. J. H. J. Upham, three impressions were made: *First*, That the general membership of the medical profession were eager for self improvement in the newer developments of medical knowledge. *Second*, There is an awakened interest in our membership in the present social and economic questions confronting the country as a whole and especially those confronting the physician in every day practice. *Third*, There is a greater obligation of medicine and medical practice; because scientific investigations have laid the foundation of preventive medicine, scientific research, public health work, and curative practice.

President-elect Dr. Irvin Abell spoke briefly, urging the members of the association to preserve our system of medical care and at the same time make its benefits available to all classes of our population.

The Secretary, Dr. Olin West, reported that there was an increase of over 4,000 members, making the total for the year up to April 1st, 1938, of 109,435; gross earnings and miscellaneous income were larger than a year ago, while operating expenses were also considerably larger.

A warning was sent out to those state and county societies that might be caught by the Social Security Act, and Income Tax. The fact that state and county medical societies might be liable for taxes under the Social Security Act and were required to prove their right for exemption brought to light the fact that many such associations were unaware of the possibility of a similar tax liability and obligation under the Federal Income Tax Act. *Income Tax Act of 1936*, Section 101, paragraph 6: "Corporations, and any Community chest, fund, or foundation, organized and operated exclusively for religious, charitable, scientific, literary, or educational purposes, or for the prevention of cruelty to children or animals, no part of the net earnings of which inures to the benefit of any private shareholder, or individual, and no substantial part of the activities of which is carrying on propaganda or otherwise attempting to influence legislation." The bureau of legal medicine and legislation has brought this matter to the attention of the State Medical Association and has given them full instructions as to procedure for themselves and their respective County Medical Societies.

Dr. Arthur W. Booth, Chairman of the Board of Trustees, reported that three physicians had been selected as worthy of the Distinguished Service Award of the American Medical Association and asked that a vote be taken by ballot as to the selection of the one to receive the Award. Drs. Simon Flexner of New York, Ludvig Hektone of Chicago, and Rudolph Matas of New Orleans were voted upon and Dr. Rudolph Matas was chosen for the Award.

In the reports of the Board of Trustees, the chairman gave a most interesting detailed report of each of the committees dealing with the general work of the Association, business operations, the *Journal of the American Medical Association*, special Journals, etc.

The Council on Pharmacy and Chemistry reported on their investigations of catgut sutures and Congress, no doubt, established the Institute of Health with laboratories so that national control and regulation of catgut, sutures might insure sterility and high quality material. The sulfanilamide episode also made both council and the profession more alert to the possible dangers in the use of drug products that have been placed on the market without proper scientific investigation and without establishment of the necessary standards.

Federal Legislation has this year enacted the National Cancer Institute Act:

(a) To conduct, assist, and foster researches, investigations, experiments, and studies relating to the cause, prevention and methods of diagnosis and treatment of cancer;

(b) To promote the coördination of researches conducted by the Institute and similar researches conducted by other agencies, organizations and individuals;

(c) To procure, use and lend radium, as hereinafter provided;

(d) To provide training and instruction in technical matters relating to the diagnosis and treatment of cancer;

(e) To provide fellowships in the Institute from funds appropriated or donated for such purpose;

(f) To secure for the Institute consultation services and advice of cancer experts from the United States and abroad; and

(g) To cooperate with State health agencies in the prevention, control, and eradication of cancer.

An Act authorizing the Bureau of Mines to manufacture and sell helium gas for medicinal and other uses and an act devolving on the Federal Trade Commission, jurisdiction over the advertising of foods, drugs, diagnostic and therapeutic devices and cosmetics.

The address of Josephine Roche, Chairman of the Interdepartmental Committee to coördinate Health and Welfare Activities with the Federal Government was read by Dr. Warren F. Draper of the United States Public Health Service:

In the creation of the Interdepartmental Committee in 1935 following the passage of the Social Security Act, President Roosevelt designated the assistant secretaries of four government departments: The Treasury, Interior, Agriculture and Labor, acting with the chairman of the Social Security Board. A national survey was made and conclusions drawn that there existed grave and far reaching needs, because of unemployment, starvation wages, indecent housing and utterly inadequate food conditions, and causing economic waste.

The reports claimed that on an average day of the year, there are four million or more persons disabled by illness, and that in a year a quarter million women do not have the advantage of a physician's care at delivery, 15,000 being delivered by neighbors or relatives, and 223,000 by midwives, most of whom were untrained and ignorant; 40,000 young adults die of tuberculosis yearly; and an increasing annual disability due to untreated sick persons is demanding concerted action on the part of the public for satisfactory solution.

The National Health Conference at the suggestion of the President is inviting representatives of the interested public and of the medical and other professions to examine the health problems in all their major aspects and to discuss ways and means of dealing with these problems.

The National Health Conference was called for July 18th at Washington, D. C., and a committee from the House of Delegates invited to attend.

Dr. W. F. Braasch, Chairman of the Committee on Medical Care, challenged the report of the Interdepartmental Committee and no time was lost in seeking more accurate survey through a nation-wide survey of the actual supply of medical care. This information has been sought through the local district medical societies and the reports sent to the State Chairman and then to Dr. Braasch.

The survey of need for medical care in the United States has been most carefully done and reports show that fully 90 per cent of all sick persons are attended by physicians, and the other 10 per cent either did not seek medical aid or were attended by other practitioners of the healing arts.

Reports on international morbidity and mortality rates, rank

the United States as one of the most healthful countries in the world.

Thorough investigation into all the new forms of medical practice has produced sufficient evidence on practically every scheme for organizing medical services to disprove the claim that some organizational arrangement can lower the cost of good medical service. Certainly no system of collecting payments for medical care can lower the average cost of \$25 to \$30 per person annually.

RESOLUTIONS

Resolutions Requiring of Foreign Graduates Full Citizenship in the United States.

Dr. William R. Molony, Sr., California, presented the following resolutions, which were referred to the Reference Committee on Medical Education: (61)

Whereas, the license to practice medicine and surgery in many countries is limited strictly to citizens of these countries; and

Whereas, In addition to holding full citizenship, each applicant is required in several of these countries to show that his medical education was pursued and completed in said countries; and

Whereas, Many foreign graduates in medicine and surgery in increasing numbers are seeking admittance to the practice of medicine in these United States; and

Whereas, In order to convey adequately to these applicants a full and satisfactory knowledge of the American conception of patriotism and of ethical ideals in medicine, it is necessary that a period of residence be required; therefore be it

Resolved, That in addition to the requirements for foreign graduates, as outlined in a resolution adopted by the House of Delegates for the American Medical Association in 1936, it is highly desirable that an additional requirement of full citizenship in the United States of America be demanded; and be it further

Resolved, That the House of Delegates of the American Medical Association approve the foregoing and that a copy be sent to the properly constituted officers of each examining board of the United States and to the Federation of State Medical Boards, with the request that they consider seriously urgent need for the adoption of such rules and/or legislation necessary to put the purposes of these resolutions into effect.

Resolution Dealing with Alcoholic Intoxication.

Dr. Thomas F. Thornton, Iowa, presented the following resolution, which was referred to the Reference Committee on Miscellaneous Business: (77)

Whereas, The medical and legal professions, the courts and the public have been repeatedly unable to determine legally the sobriety or the degree of intoxication of individuals accused of violating the established rules and laws of safety; and

Whereas, Such inefficient methods of clinical and laboratory diagnosis and legal procedures are unscientific and a direct cause of much unnecessary expense, litigation and suffering and directly encourage minor verdicts for major offenses; therefore be it

Resolved, That the executive council of the Iowa State Medical Society ask the cooperation of the American Medical Association in a study looking toward the determination of definite, legally acceptable, scientific clinical and laboratory tests for alcoholic intoxication by

1. Studying and recommending such clinical and laboratory tests as have proved successful in Europe and in this country;
2. Prescribing a standard of qualifications of the persons, laboratories and hospitals taking and making these tests;
3. Suggesting such legislation as may be necessary to establish these clinical and laboratory tests;
4. Coördinating the medical and legal profession with the various police agencies and safety councils in this activity; and
5. Suggesting adequate financial support from such funds as may be available from the liquor license tax or elsewhere to supply equipment necessary to taking and making such tests.

Resolution from the Section on Ophthalmology Dealing with Visual Standards for Operating Motor Vehicles.

Dr. Arthur J. Bedell, Section on Ophthalmology, presented the following resolution, which was adopted on motion of Dr. Bedell, seconded by Dr. Charles H. Goodrich, New York, and Dr. W. Albert Cook, Oklahoma, and carried after discussion by Dr. J. R. Westaby, South Dakota, and Dr. Bedell:

Whereas, For many years state licensing boards have asked for official visual standards for operating motor vehicles; and

Whereas, A committee of the Section on Ophthalmology of the American Medical Association has had this problem under serious consideration for many years and has made its report; and

Whereas, This report was accepted by the Section on Ophthalmology of this Association; and

Whereas, The delegate of the section was directed to present this report to the House of Delegates; be it

Resolved, That the following be accepted as the approved American Medical Association standards:

A. *For an Unlimited License:*

1. Visual acuity with or without glasses of 20/40 Sn. in one eye and 20/100 Sn. in the other.
2. A form field of not less than 45 degrees in all meridians from the point of fixation.
3. The presence of binocular single vision.
4. Ability to distinguish red, green and yellow.
5. Night blindness not to be present.
6. Glasses when required be worn while driving and those employed in public transportation be provided with an extra pair.

B. *Visual Standards for Limited License:*

1. Visual acuity of not less than 20/65 Sn. in the better eye.
2. Field vision of not less than 60 degrees horizontally and 50 degrees vertically from point of fixation in one eye.
3. Diplopia not to be present.
4. Glasses to be worn when prescribed.
5. Coördination of eye, mind and muscle to be fully adequate to meet the practical visual road tests.
6. A limited license not to be issued to those employed in public transportation.

C. *Renewals, Retesting and Reexaminations:*

1. Renewals of license to be issued at least every third year. The applicant shall with each renewal make a declaration that he knows of no visual defect which has developed during the past year.
2. Retesting of acuity to be made at least every six years.
3. If any visual defects have developed, and examination by an ophthalmologist and the report thereof, to be required before reissuing the license.
4. License to state thereon the specific limitation for driving.

ELECTION OF OFFICERS

Dr. Rock Sleyster, Wauwatosa, Wisconsin, was nominated for president-elect and given no opposition.

Dr. Howard Morrow of San Francisco was chosen vice-president.

All other officers were reelected except the speaker of the House of Delegates who wished to retire from office while still warm.

Dr. H. H. Shoulders, the vice-speaker, was elected speaker.

The place of annual sessions for 1939, 1940 and 1941 were chosen by ballot: St. Louis for 1939, New York for 1940 and Cleveland for 1941.

REPORT OF SPECIAL SESSIONS

A Special Session of the House of Delegates was called at Chicago September 16th, 1938, for consideration of the National Health Program submitted to the National Health Conference held in Washington, D. C., July 18th, 1938.

This program was set forth and largely supported by representatives of various governmental departments. The representatives of the American Medical Association were not consulted about the program or asked to present alternative programs. It was a single proposal on which the chairman sought approval for legislative purposes.

President Dr. Irvin Abell's address was in defense of the traditional ethics of the profession which have maintained our high standards on such noble principles. He pointed out the indefiniteness of the National Health Program and the absence of opportunity for presentation of alternative proposals or any detailed discussion of any part of the plan the American Medical Association wished to present, one of which was the need for a Cabinet office of Health and Medical Service. Dr. Abell discussed the unfair picture painted by speakers of the National Health Conference. America was depicted as a nation

one-third ill fed, housed and cared for in health, dying in numbers for lack of our services.

After considerable discussion by delegates from many states, five committees of five members each were appointed to consider the five divisions of the National Health Program and to bring in reports to the House as soon as possible.

REPORT OF DIVISION 1—Public Health.

The Committee recommended:

1. The establishment of a Department of Public Health with a secretary who shall be a doctor of medicine and hold a seat in the President's Cabinet.
2. The endorsing of the general principles outlined by the Technical Committee for the expansion of the Public Health Service.
3. All programs for expending sums of money should be expanded by state health departments, approved by the proper committees of the State Medical Association.
4. All expenditures of public funds made for the treatment of individuals should be limited to the indigent.

REPORT OF DIVISION 2.

The Committee favored expansion of hospital facilities where actual need exists.

Use of private and proprietary hospitals to solve problems for the indigent when possible.

REPORT OF DIVISION 3—Medical Care of the Medically Needy.

The Committee recommends:

1. The maintenance or extension of constantly improving sickness service to the indigent.
2. Clear understanding on the part of the public at all times of the local needs for medical service, the responsibility for its delivery, the actual expense involved for such service, as well as the source and distribution of the funds in payment for such service.
3. Complete separation at all times from the influence of partisan politics.

REPORT OF DIVISION 4—Ways to Assist in the Care of the Needy.

The Committee approves the principle of:

1. Hospital service insurance.
2. Workmen's compensation laws.
3. Voluntary indemnity insurance to finance sickness costs without subsidy.

The Committee opposed all forms of compulsory health insurance with its inevitable accompaniments of government subsidy and control.

REPORT OF DIVISION 5—Compensation for time lost by Sickness.

The Committee endorses the proposition that compensation for loss of wages due to sickness would have a distinct influence toward recovery of those disabled and should in a measure reduce permanent disability.

To facilitate the accomplishments of the objectives of the various divisions with recommendations of the Committees seven physicians were appointed by the speaker under the Chairmanship of President Dr. Abell to confer and consult with the proper federal representatives relative to proposed National Health Program.

REPORT OF THE PRESIDENT OF THE SOUTH DAKOTA STATE MEDICAL ASSOCIATION

**J. F. D. Cook, M.D.
Pierre, South Dakota**

To the Officers, Councilors, and Delegates of the State Medical Association in Session at Aberdeen, South Dakota, April 24, 25 and 26, 1939.

I regret that circumstances have developed that make it impossible for me to be present. Conflicting dates with the United States Public Health Meeting, Washington, D. C., with Surgeon General Dr. Parran, April

20th through the 26th, 1939, prevent my attendance. Since as Superintendent of the State Board of Health, it is required that I attend the Washington meeting, I am asking Dr. Shirley to present this, my report.

As your President, invitations were received from Yankton, Aberdeen, Pierre, Whetstone Valley, and Madison District Medical Societies. It is anticipated that the Councilors will make reports of their activities.

I take this opportunity, through the assistance of Dr. Shirley, of thanking you for your bearing with my feeble efforts. Your cooperation in our legislative activities has been very helpful, and the tentative program speaks for a successful and profitable scientific season.

1939 Legislature. The session opened with a well qualified personnel in the Public Health Committee of the House and Senate. The Public Health Committee in the House had for its chairman, Reverend Hove. It also included Dr. Mills of Wall, Mr. Lothrop of Aberdeen and other members. The Senate Public Health Committee had for its chairman, Mr. Stavig of Rosholt in Roberts county, Reverend Johnson of DeSmet, Odell, McHugh, Monson and others.

The Basic Science Bill was introduced early and was designated as House Bill No. 10. This bill was introduced as drawn by the Honorable Karl Goldsmith and as approved by the Council.

The osteopaths and chiropractors had introduced House Bill No. 47 entitled, "An Act to Regulate the Distribution and Participation in the Disbursement of Funds Allotted for Any Public Health Program. To Prevent Discrimination in the Rights of Clients or Citizens Participating in Such Public Health Program to Choose Any Licensed Physician or Licensed Practitioner of the Healing Arts to Render Services Provided by Such Public Health Program and Providing a Penalty." This act amended the 1937 law. However, in this we were able to exempt, by amendment, all funds pertaining to the Crippled Children Program.

House Bill No. 47 and House Bill No. 10 were duly adopted. The Osteopathic Surgery Bill No. 24 was lost. Senate Bill No. 218 which was introduced by the chiropractors, raised their standard of qualifications to a high school course and four years of college. This was passed by the House and Senate.

An interesting bill appeared in the Senate: Senate Bill No. 154. This bill was to amend Section 27.1081 of the 1939 Code. This bill would place the appointment of the County Boards of Health in the hands of the County Commissioners. This proposed bill, if enacted and became a law, would completely upset the State Board of Health's control over the reporting of communicable diseases and other health matters that might obtain in the political subdivisions of our state. It would also completely disarrange any program that we might have in cooperation with the United States Public Health Service. The bill failed to receive a committee report.

The Public Health Committee of the House, under the direction of Reverend Hove and Dr. Mills was able to report to the House, and with very little discussion passed the House and presented to the Senate for their adoption, two bills in support of a venereal disease pro-

gram. These were House Bills 247 and 248. House Bill 247 proposes to require every physician attending a pregnant woman to take or cause to be taken a sample of her blood at the time of the first examination and to submit such sample for standard serological tests for syphilis to the State Health Laboratory of the State Board of Health or such other laboratories as are approved by the State Board of Health. House Bill No. 248 proposes to require as a condition precedent to the issuance of a license to marry that both parties to a proposed marriage present a certificate from a licensed physician that they are either free from syphilis or not in a stage of the disease whereby it may become communicable, as nearly as can be determined by a thorough physical examination and such standard microscopic and serological tests as are necessary for the discovery of syphilis. House Bill No. 248 as passed by the House and Senate came to the desk of Governor Harlan J. Bushfield. The Governor called me to his office for consultation over this bill. It appeared that he had received considerable comment proposing to veto this bill. He said he noticed that the bill did not carry any fee schedule. If a schedule had been proposed by the proponents of the bill, it was deleted before it came to the House. I was of the opinion and had the understanding that a fee schedule would be proposed in the bill. The Governor wanted me to make a statement as to what the usual fee would be for procuring the blood for a serological test. After some discussion, I promised the Governor that I would ask the Council and House of Delegates of the State Medical Association to adopt a fee schedule of two dollars (\$2.00) for the procuring of the blood for serological examination which was to be sent to the State Laboratory. He understands that any further physical examination requires subsequent fees. I hope that the Delegates will approve of such a fee schedule to cooperate in the carrying-out of this program.

Reverend Hove and Dr. Mills are to be commended for their activity in presenting and enacting such constructive public health measures.

House Bill No. 78 amended the Compensation Act, raising the maximum fee for hospital service and other expenses to two hundred dollars (\$200.00), and left the medical and surgical services at one hundred dollars (\$100.00). The efforts of the Hospital Association were instrumental in bringing about the enactment of this bill.

I want to call your attention to House Bill No. 313 which was the General Appropriation Bill. The State Board of Health appropriations were materially reduced from fifty-seven thousand, twenty-five dollars (\$57,025.00) per year to fifty thousand, two hundred dollars (\$50,200.00) per year, making a reduction of six thousand, eight hundred and twenty-five dollars (\$6,825.00). I might say that the economy program was evident throughout all departments of the state. One particular item, the item of twenty-five thousand dollars (\$25,000.00) for crippled children, was recommended at five thousand dollars (\$5,000.00). However, we were able, through our friends, to raise this appropriation back to

the original twenty-five thousand dollars (\$25,000.00).

Senate Bill No. 16 was an amendment to the old beer law and the passage of this bill means that the hospitals will continue to enjoy the benefits of the beer fund for at least another two years.

The members of the legislature are to be commended for their activities in the constructive public health legislation; Honorable Karl Goldsmith for his efficient and gentlemanly conduct of activities in behalf of our sponsored legislation. He gave untiringly of his time and advice on all matters; Dr. Mills of Wall, who was in my opinion, a most valuable member in the House by his efficient untiring efforts in the legislature. He was on the floor at all times and nothing escaped his notice that was in line of constructive legislation.

RECOMMENDATIONS

That the Council make contact with Honorable Karl Goldsmith and consider employing him as a legal councilor for the Medical Association on an annual basis.

Basic Science Law (Board Provisions). The House of Delegates should choose two or more names of physicians to be presented to Governor Bushfield from which he may select one physician to be appointed on the Basic Science Board. Also, two or more names of professors to be presented to Governor Bushfield from which he may select one to be appointed on the Basic Science Board. I am enclosing a copy of the Basic Science Law for your information.

The one hundred dollars (\$100.00) allotted to me was spent as any Scotchman would have done and if requested by the Secretary-Treasurer, I will give an itemized account.

It is with regret that I am not able to be with you and take all the "heat" that you may be able to produce. Thank you, again, for your cooperation.

ADDRESS OF THE PRESIDENT-ELECT OF THE SOUTH DAKOTA STATE MEDICAL ASSOCIATION*

J. C. Shirley, M.D.

Huron, South Dakota

The medical profession in the state of South Dakota has just passed through one of the most significant years in its history, under the guidance of its President, Dr. J. F. D. Cook. The year was significant in that a legislative program was successfully carried through that will aid in protecting the public from undesirable and unqualified practitioners of the healing art. The basic science law, which was passed in the last legislative session and bitterly opposed by those who had only selfish interest to serve, showed that things can really be accomplished. It is all the more significant at this time because in the minds of many the medical profession is on trial nationally.

Like individuals in other organizations, some medical men have become dissatisfied with attempts made to improve conditions and have withdrawn their support from their local society in a misguided attempt to voice

*Read before the South Dakota State Medical Association, April 24, 1939, Aberdeen.

a protest, thus weakening the only force available to correct unsatisfactory conditions. To have an effective and worthwhile force, it is imperative that we have an objective that will merit support and a membership of interested, aggressive individuals composed of nearly 100 per cent of those eligible for membership. The year's efforts have demonstrated that the State Medical Association is capable of representing its members and has placed those who remain outside of the Association in the position of asking for a free ride.

It is also apparent that the efforts of the Allied Council are exerting greater influence on subjects related to public health and the problems affecting the practice of medicine.

One point should be emphasized, and that is that the medical profession is not unanimous in its political affiliations and, therefore, matters of a partisan nature should have no part in our program.

With the changes due to social unrest, there is a tendency to the development of a socialistic attitude toward medical care, simply one aspect of a growing social conscience. We, as physicians, cannot disregard this tendency and we must recognize that there are definite problems in regard to furnishing adequate medical care to all of our people. Medical men are conscious of these needs and stand ready to take the lead in working out a just and fair solution after due and deliberate study. I think that we must maintain the same scientific attitude toward these problems that we have had to develop in regard to innovations in scientific medicine. That is, a perfectly open mind but constantly and severely critical, for, in the long run, this attitude will probably prove to be the most humanitarian.

We hear a great deal about the cost of medical care, but very little about the cost of adequate medical care. Studies have indicated that the American people spend about as much for tobacco as they do for medical care. It is generally recognized that the problem is not the total cost but distribution of the cost. It is said that the majority of illness is self-limiting and can be very well cared for in the home at a comparatively low cost. On the other hand, something like 20 per cent of illness is serious enough to require hospital care, and it is said that this 20 per cent accounts for something like 80 per cent of the total cost. This means that, at present, illness is something which a family cannot provide for in a yearly budget. One year they may get by with practically no expense, only to be faced by a very heavy expense another year. One solution to this problem that is offered is some form of insurance, and some hospitals are now providing hospital care on something like an insurance basis. That is, the family pays a certain amount each month and the hospital agrees to furnish the care that is needed. In most instances this provides for hospitalization only and does not include physicians' fees. This scheme is in use in many cities and has the endorsement of some of the medical organizations. But you must remember that voluntary insurance is one thing and compulsory health insurance is an altogether different thing.

Compulsory insurance is one of the things which we

are beginning to hear about, and there are many dangers connected with it. In the first place, it is apt to mean that we have either a corporation or the government engaged in the practice of medicine, and the scheme dictated by lay individuals who can have no real knowledge of the problems. Incidentally, no one is competent to say what constitutes adequate care in a given case except a physician who is on the scene at the time. The only alternative is voluminous detailed reports, and is another of the faults of health insurance. It means that doctors become so busy filling out blanks that they have no time to care for people who are sick. Efficiency experts can tell you how many patients you should see in a day and how much time you should spend on them. At the end of the day you would have neither time nor inclination for the study of new developments in medicine or for careful thought which you would otherwise give to such things as the problems of diagnosis and treatment of some of the cases that have puzzled you during the day. Health insurance has been shown to definitely increase loss of time through illness, partly because of better care, perhaps, but also from the inevitable inborn tendency to chisel. One of the other serious problems involved in any scheme to furnish medical care on an insurance or salary physicianed basis is that it is very likely to break up the long cherished association between the family physician and his patients. One of the first principles of a program of adequate care must be to preserve a free choice of his physician by the patient. Anything else amounts to the worst form of regimentation.

What constitutes adequate care? That in itself is worth a little study. The report of President Roosevelt's committee to study the need for a Federal Health Program starts out by saying, "The general level of health in the United States is higher than at any other time in history"; and according to one of the Washington correspondents, it might have added, "or in the history of any other nation in history." The average life span has been increased many years, so it may be that the need for any new measures has been exaggerated. The average physician willingly donates a fair proportion of his time to the care of the indigent, but it is true that there are problems that arise where that is not enough. The science of medicine is of course making wonderful strides, and we are all proud of that fact. Think of insulin, scarlet fever serum, liver extract, and now sulphanilamide. They have all come into use within the last fifteen years—greater knowledge in surgical diagnosis and more exact application of delicate surgical technique—along with hundreds of less important things. But the fact is, that in most instances these new weapons are expensive to use although they are a great aid in caring for the sick.

For instance, consider the Drinker Respirator, which is used in a few cases of infantile paralysis. A hospital or a physician may actually need such equipment only once in five years, and yet the equipment cost something like \$2,000.00. This particular problem has been recognized and the American Legion has put several of these Respirators in hospitals in the State. That is a

spectacular problem—one that has been given some publicity, but there are other such as pneumonia serum, which may cost from \$40.00 to \$60.00 for the treatment of one patient. In one instance of which we know, tetanus serum costing something like \$400.00 was used on one patient, and a life was saved. A great many of the things which modern medicine has made available are very expensive. Radium and deep X-ray therapy for cancer is another instance.

Any program which attempts to provide medical care must provide for all of these things. Otherwise, it does not benefit the people at all. It may give the physician a few dollars for work which he would have otherwise donated, but so far as the public is concerned, no one has benefited.

Some form of voluntary health insurance with government agencies, local, state, and federal, participating with the recipient in the premium payments, may be needed. The recipients in this plan would have to be those included in the lower income group, and it would have to be arranged so that the actual management would remain in the hands of the doctors themselves.

In our state we have a group of men who, through necessity, have become rather efficient administrators of relief. They are the County Commissioners. I think that, on the whole, they have done well in providing medical care for the poor, considering the very meager funds available to them. If we are to have grants from the government to help provide such medical care, then allotments to the County Board might be a sensible way to begin. Indeed, it might go a long way toward solving the problem.

It is not my purpose to go into a discussion of the merits or demerits of our own FAC program—you are as familiar with them as I am. But, it must be remembered that on our part, at least, it was intended only as an emergency measure to provide care for an indigent group. In theory it does fulfill some of the conditions of a program of adequate care. It maintains the free choice of the physician by the patient and it is entirely voluntary on the part of the patient. However, it has taught us that not even emergency care can be provided

to an unselected group for the monthly fee that was established.

In these days of rapid change we can easily lose our perspective and forget that there are fundamentals which do not change. In time of need people will always want what they believe to be the very best medical care available to them. We know, and most of them know, that in the great majority of cases this can best be provided by the family physician in the home or office. It is our duty to see that propagandists do not mislead the public into thinking otherwise.

In conclusion may I quote the following from an editorial in the *American Journal of Surgery*: "To one who has been active in the ranks for over thirty years, a longing fills the heart for the old order of two decades or more ago when the primary thought in the minds of physicians was to care for the sick and advance the science of medicine. Perhaps the world has already moved to the point where change in administration has become inevitable, but we can hope that primary aim will remain the central governing thought of the medical profession.

At any rate, we must assure ourselves that medicine will remain in the control of the physician. We must not be forced to transfer our professional birthright to politicians, to large foundations or to physicians who have never devoted ten minutes to the actual practice of medicine. We know that we must meet the economic needs of the times, and, after due and deliberate study and discussion, we shall do so. But we must also stand shoulder to shoulder, yielding no infinitesimal part of our heritage, allowing no outsiders to regulate and control our profession.

Are we to have socialized medicine, health insurance, or some form of government control? Are we to turn haphazardly to rapidly brought out schemes? Let the doctors speak, through their representative organizations, to retain for the practicing profession the control of the practice of medicine. A resolution for all of us for 1939—in the words of the Constitution of the American Medical Association—to 'promote the science and art of medicine and the betterment of public health.' "

SOUTH DAKOTA STATE MEDICAL ASSOCIATION ROSTER - - 1939

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Bates, W. A.	Aberdeen
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Boyd, Frank	Mitchell
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Buchanan, R. A.	Huron
Bunker, Paul	Aberdeen
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Bury, Chas. L.	Geddes
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Bushnell, W. F.	Elk Point
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Brenckle, J. F.	Mellette
*Butler, C. A.	Lake Preston
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Chichester, J. G.	Redfield

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Clark, B. S.	Spearfish
Clark, O. H.	Newell
Cochran, F. B.	Plankinton
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Conner, E. I.	Alcester
Cook, J. F. D.	Pierre
Cooley, F. H.	Aberdeen
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Hoyne, A. H.	Salem	Nelson, J. A.	Howard	Van Demark, G. E.	Sioux Falls
Hummer, F. L.	Lead	Nessa, N. J.	Sioux Falls	Vaughn, J. B.	Castlewood
Hummer, H. R.	Sioux Falls	Newby, H. D.	Rapid City	Volin, H. P.	Lennox
Hubner, R. F.	Tripp	Nilsson, F. C.	Sioux Falls	Vollmer, F. J.	Howard
Hyden, Anton	Sioux Falls	Northrup, F. A.	Pierre	Watson, E. S.	Estelline
Jackson, A. S.	Lead	Nauman, E. C.	Rapid City	Weber, R. A.	Mitchell
Jernstrom, R. E.	Rapid City	Newkamp, Hugo	Hosmer	Weishaar, C. H.	Aberdeen
Johnson, A. E.	Watertown	Ohlmacher, J. C.	Vermillion	Westaby, J. R.	Madison
Johnson, G. E.	Yankton	Opheim, O. V.	Sioux Falls	Westaby, R. S.	Madison
Jones, E. W.	Mitchell	O'Toole, T. F.	New Underwood	Whiteside, J. D.	Aberdeen
Jones, T. D.	Bowdle	Overton, R. V.	Winner	Whitson, Geo. E.	Madison
Jordan, L. E.	Chester	Olson, C. L.	McIntosh	Willhite, F. V.	Redfield
Jordan, A. A.	Highmore	Pangburn, M. W.	Miller	Wilson, F. D.	Winner
Jorgenson, M. C.	Watertown	Pankow, L. J.	Sioux Falls	Wright, O. R.	Huron
Joyce, E.	Hurley	Parke, L. L.	Canton	Williams, F. E.	Wakonda
Kalayjian, D. S.	Parker	Peabody, P. D., Sr.	Webster	Willoughby, F. C.	Howard
Karlins, W. H.	Webster	Peabody, P. D., Jr.	Webster	Wexler, M. R.	Watertown
Keegan, Agnes	Aberdeen	Peeke, A. P.	Volga	Young, E. M.	Mitchell
*Keeling, C. M.	Springfield	Pemberton, M. O.	Deadwood	Zimmerman, Goldie	Sioux Falls
Kegaries, D. L.	Rapid City	Pearson, A. W.	Sisseton	Zachritz, G. F.	Faulton
Keller, S. G.	Sioux Falls	Pfister, F. A.	Webster	Zellhoefer, H. W. K.	Sioux Falls
Keller, Ted	Leola	Pittenger, E. A.	Aberdeen		
Kellogg, H. E.	Brookings	*Perkins, E. L.	Sioux Falls		
		*Posthuma, Anne	Sioux Falls		

* Honorary. ** Associate. † Deceased.

Ectopic Pregnancy*

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IN the preoperative period of medicine, the diagnosis of ectopic pregnancy was usually made at the post-mortem table. The mortality rate at that time varied from 65 to 95 per cent. Those women that were fortunate enough to have encapsulation take place or hematoceles develop would possibly survive. With the advent of surgery, there still remained several schools of thought concerning the treatment of ectopic pregnancy. At that time, there were probably more advocates of nonsurgical than surgical management. Hunter Robb, experimenting on normal pregnant dogs, found that when the ovarian artery was cut, the dogs did not die of hemorrhage, and he became one of the strongest advocates of nonsurgical treatment. The nonsurgical management at that time consisted of various methods of treatment. One method was the use of electricity. The galvanic current was introduced for the purpose of destroying the life of the fetus, thus terminating the pregnancy. Another method was that of killing the fetus by morphine injections. The first operations for extra-uterine pregnancies were performed in 1878. Today, of course, the treatment is entirely surgical, with a mortality rate ranging from four to eight per cent.

Although ectopic pregnancy is not a rare condition, the diagnosis is frequently incorrect. This is due to the fact that no one test or symptom makes the diagnosis. Cases are often diagnosed as appendicitis, salpingitis, or twisted ovarian cyst. The majority of extra-uterine pregnancies are in the tubes. The ovarian and abdominal pregnancies are so rare that they need not be discussed here.

When a patient has a previous pelvic inflammatory history, has missed one or two menstrual periods, is spotting, has abdominal-pelvic pain, a unilateral adnexal mass, and is in severe shock, the diagnosis is quite evident. As stated above, the majority of cases are not this simple. However, the most important and constant but by no means invariable symptoms are pain, vaginal bleeding and shock of some degree. It will be observed that all these are symptoms of disturbances of the pregnancy, and these, along with certain laboratory and physical findings will help in our diagnosis of the atypical cases.

In mentioning these tests and their value, one must first state that the pelvic examination often reveals nothing of importance, as a mass, if present at all, varies in size and firmness. However, palpation of the cervix and uterine body causes considerable pain to the patient. In most cases, a tender mass may be palpated, and in a very few cases, pulsation may be felt. Therefore, although the physical examination is important, it is also confusing excepting in cases where an adnexal mass may be felt (a typical history), and signs of pregnancy

noted. The temperature and pulse rate are not of great value. The temperature, usually not high, generally varies within the range of other common conditions, such as salpingitis and subacute appendicitis. The blood count is not always of much help. The red blood count is not greatly affected except by severe rapid hemorrhage, and the white count does not show much increase with small hemorrhages. While it is true that massive hemorrhage results in high leucocytosis, and lowered red blood cell count, the effect of such change on the patient's general condition would be evident without either a high white count or a low red count.

The sedimentation test may be of considerable value in differentiating an ectopic pregnancy from an inflammatory process of the pelvis. A sedimentation time of less than 30 minutes is a good indication of an acute inflammatory process, except in cases of infected hematoceles, while a sedimentation time of 60 minutes or over would favor an ectopic pregnancy. "Cullen's sign," a bluish-black discoloration about the umbilicus, is inconstant, and if not present, does not necessarily mean that there is no pregnancy. Blood pressure readings express a degree of shock and cannot be relied upon too greatly, as the blood pressure may not fall until the patient is in critical condition.

The hormonal test for pregnancy, in the majority of cases, is not of great value, as most of the cases are purely emergency. If the hormonal test is positive, it does not indicate whether the pregnancy is extra-uterine or intra-uterine. If the test is negative, it does not rule out extra-uterine pregnancy, as there may have previously been a death of all embryonal elements. Pathological examination of intra-uterine decidua may be suggestive but not conclusive. In ectopic pregnancy, one does not find any chorionic elements in the decidua. However, the absence of chorionic elements does not necessarily rule out intra-uterine abortion, because in intra-uterine abortion, so much degeneration may take place that it is impossible to recognize the chorionic elements.

Aspiration of the posterior cul-de-sac by way of the vagina many times will give an added help in diagnosis, and if blood is aspirated, a laparotomy should be done at once. The aspiration is a relatively simple procedure and in many cases, along with other findings, will establish the diagnosis. Of course, there is some danger of infection occurring, and this should not be done as a routine measure.

One method that is being used in very questionable cases is visualization of the peritoneal cavity. This is done by means of the peritoneoscope. The procedure is not intended to replace surgery, nor to be used as a short-cut in making the diagnosis, but has its definite indications in differential diagnosis.

While ectopic pregnancy is definitely a surgical condition, the technic of operating is one of considerable im-

*Presented at the annual meeting of the North Dakota State Medical Association, Bismarck, May 18, 1938.

portance, and of some difference in opinion. The abdominal route is the accepted method, although some men are removing the tube by the vaginal route, which is a very difficult procedure. In operating for ectopic pregnancy, judgment of what tissue to be removed is a matter of importance. If only the offending tissue is removed, one must remember that the same process that caused the original trouble may act again on the opposite tube. The figures of Smith, who has collected valuable statistics on this point, show that only about 33 per cent have normal uterine pregnancies later, and about 15 per cent have a repeated ectopic pregnancy. The question, therefore, of saving or removing the other tube is often an important one, and must be answered as many others in pelvic surgery, taking into consideration the age of the patient, her desire for children, etc. Of course, in serious cases, one must do only enough to stop the hemorrhage.

Fever often marks the postoperative course, which in the absence of peritonitis may be due to the intraperitoneal blood. However, it is perfectly safe, after re-

moving the clots, to leave the free blood in the peritoneal cavity, to be reabsorbed and used again. This suggested collecting the blood from the peritoneal cavity, defibrinating it, mixing it with Ringer's solution, and re-injecting it into the veins of the arm. Of course, it is advisable to defer operation in very serious cases long enough to transfuse or give other supportive treatment in order to lessen the risk of operation. In hospitals where blood banks are maintained, it is possible to transfuse before, during and after the operation.

In conclusion, one may summarize these points by saying that:

1. Ectopic pregnancy is not a rare condition, but a very interesting one.
2. The diagnosis is especially difficult.
3. Diagnosis cannot be made from any one sign or symptom.
4. A very careful history is of greatest importance in making the diagnosis.
5. Ectopic pregnancy should always be kept in mind in diagnosing acute abdominal cases.

Annual Report of the Eye Health Committee of the American Student Health Association

Just one year ago the Eye Health Committee presented its first annual report at the meeting of the American Student Health Association in Chicago. At that time we tried to emphasize the importance of the problem of vision conservation which affects over a million college students annually. Sydenstricker and Britten¹ have shown that the highest incidence of visual defects occurs in professional people. Boynton² has shown that not only do students enter college with a higher incidence of visual defects than their contemporaries in age who go into the industries, but that during the college career, about one in six of those entering with presumably good vision will need glasses before graduation, and, during the college course one in eleven of the same group will suffer a serious loss of visual acuity. Ferguson³ reports persistent and repeated complaints of eyestrain symptoms among students rating 20/20 on the Snellen test and a cessation of these complaints following complete ophthalmic examination and correction. The United States Naval Academy reports that the incidence of disqualifications of senior cadets because of visual impairment became such a problem that it was found necessary to require each cadet at entrance to pass a strict ophthalmic examination including refraction. Recently the Dartmouth Eye Institute has published a monograph on Evaluation of Visual Factors in Reading.⁴

This study covers a broad field and leads the authors to a large number of significant conclusions. Some of these are of particular interest to us at this stage of our committee work. First, the authors conclude that, "Only 64 per cent of the Class of 1940 (freshmen) are free from ocular defects, have only minor defects, or have received adequate ocular care. The remaining 36 per cent of the class have not received adequate ocular care," and second, "The usual examinations given by college health services do not give sufficient consideration to the ocular condition of the students." Another interesting conclusion states "Subjects having mild or moderate degrees of ocular defects are more likely to report symptoms than those having severe degrees of defect. That is, minimal ocular defects which may be missed by the usual Snellen test examination will give rise to serious interference with the student's ability to read effectively." All of the foregoing statements serve to impress us increasingly with the fact that many college students have ocular defects which need attention on the one hand, and on the other, the methods in general use in our health services today are inadequate to diagnose and remedy these defects.

Clearly the most effective method of dealing with our problem would be to institute universal ophthalmological examinations for students at entrance and thereafter as needed. When one considers the demands made upon students' eyes during the college course this method does

⁴Presented before the American Student Health Association, New York City, December 30, 1938.

not seem extravagant, but when one comes down to earth and appraises the facilities available in our health services throughout the country one must conclude that at least for the present this elaborate examination is not universally possible and some compromise must be made. This compromise is the problem that faced the committee this year. We asked for suggestions from Association members to help us devise an effective, but simple method of testing vision and thanks to many of you shortly after last year's meeting we received a goodly number of suggestions. Our task was to devise a *simple* vision testing routine which could be used in any health service and could be universally recommended as being the best possible method of screening out those students who should be referred immediately for a complete ophthalmological examination on the one hand, and leaving behind, on the other, those who, we could assume, had no visual defects at all or only insignificant defects.

To devise a valid but simple test that could be universally recommended it was of course necessary to proceed only upon the best ophthalmologic advice in the country, and we called upon our Advisory Committee freely for their wisdom in formulating our recommendations. These recommendations have taken the form of the *Vision Appraisal Record Card* and *Accepted Standards for Vision Appraisal*. Copies of these have been sent to all Directors of student health in the Association with the hope that they will be used and criticized.

On October 6 the Eye Health Committee and the Advisory Committee held an all-day session in New York for the purpose of perfecting this *Record Card* and *Accepted Standards*. Each item was discussed separately and agreed upon by the committee and by our ophthalmologic consultants.

Your committee has also formulated a bulletin covering good study facilities for a college dormitory which is available to all health directors. The approved study lamp designed by Doctor Phelan was approved by your committee and the Advisory Committee. On this same day a joint meeting with a committee from the American Association of Teachers Colleges was held and matters relative to our common problem of vision conservation were discussed.

In our discussion of the proper use of the Snellen chart it became evident that many visual tests made by this method are quite invalid because of the improper use of the chart. Through Doctors Benedict, Hardy and Gradle, our Advisory Committee, specifications are being prepared, for approval by the Committee on Optics and Visual Physiology of the American Medical Association, for a standard holder and illuminator for the American Medical Association vision test chart. With a uniform technique being used throughout the test in a number of colleges we may expect to collect enough reliable data to furnish the basis of valuable studies.

We do not feel that the present recommendations, which we have sent to you, are the final word in vision testing, but they are the best simple methods available and should represent the springboard from which to take off in our effort to arrive at the ideal procedure. Specifically, we make the request that a number of institutions volunteer to use this recommended technique and preserve the records for a comprehensive study by the committee.

The committee wishes to express its gratitude to the members of the Advisory Committee (all of whom were present at our New York meeting in October) for their invaluable advice and generous help. Were it not for the generous help and stimulation of Mr. Carris and Dr. Phelan of the National Society for the Prevention of Blindness the work of this committee would have been entirely impossible.

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RUBY CUNNINGHAM, M.D.

R. W. BRADSHAW, M.D., *Chairman*

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Indigenous Malaria and Its Vectors in Minnesota

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THAT cases of malaria may originate in Minnesota is not only indicated by the widespread occurrence of anopheline mosquitoes capable of carrying the infection but has been proved by several instances in which the disease was acquired by individuals who had never been out of the state. One of these cases was brought to the attention of the writer by Dr. O. McDaniel, of the Minnesota Department of Health and, on investigation, was found to be a clear-cut instance of mosquito-borne infection. It was reported and the general problem discussed by Riley, (1930). Since that time, there have come to my attention a number of cases of malaria in Minnesota. Of these the great majority were clearly imported cases and some of those thought to be indigenous might be explainable on the basis of an extended period of incubation. The idea that clinical symptoms manifest themselves within ten days or two weeks after the bite of an infected mosquito has been shown to be inapplicable in many cases. Incubation periods of seven or eight months are common and Boyd and Kitchen, (1938) have reported a case of induced malaria in which symptoms were first manifest 304 days after the application of infected mosquitoes.

One of the two cases reported by Anderson, (1938) might have been acquired in northern Iowa since the man had been there on a fishing trip about a month before his infection was manifest. The second was the case of a man who lived 15 miles south of Rochester and had never been out of the state. The case reported by Weir (1937) seems equally clear-cut as the patient had never been out of the state farther than Alma, Wisconsin, just across the Mississippi from Kellogg, Minnesota.

Through the courtesy of Dr. McDaniel, I have a summary of nineteen cases of malaria reported to the State Department of Health for the years 1935-1937, inclusive. Of these nineteen cases, seven were clearly indigenous and two additional were presumably so, though the evidence is not so positive. One of these seven was acquired as the result of using for hypodermic injection a syringe belonging to another morphine addict. The few indigenous cases are not to be regarded as probable even though conceivable, sources of other human infection. It is much more probable that mosquito infections and hence potential human cases are due to the presence of malaria carriers among the million and a half tourists who come to the state each summer. The majority of these come in automobiles and many of them come from malarious districts of the South. The widespread use of induced malaria in the treatment of paresis undoubtedly adds to the chance of mosquito infections.

Concerning the moot question of the role of induced malaria in the spread of the infection, the experience

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of Swellengrebel and de Buck (1938), in the Netherlands is so extensive as to give weight to their conclusions that "unlike mosquito-borne malaria, inoculated malaria is invariably and definitely cured by a daily dose of 15 grains of sulfate of quinine continued for five days." Occasional reported relapses in patients treated with inoculated malaria they consider due to the mental state of the patients who, unless strictly supervised, cannot be relied upon to swallow the drugs they are expected to take.

There are present in Minnesota four different species of anopheline mosquitoes, each of which is known to be capable of transmitting malaria to man. These are *Anopheles maculipennis*, *A. quadrimaculatus*, *A. walkeri* and *A. punctipennis*. Of these, *A. maculipennis* and *A. quadrimaculatus* are generally regarded as the most efficient carriers of the infection. The collections of the Division of Entomology, of the University of Minnesota indicate that *A. maculipennis* is the dominant anopheline in the northern part of the state and that *A. punctipennis* is much the more common in the southern third, though it has been collected also in the Red River Valley and in Stearns and Pine counties. *Anopheles quadrimaculatus* seems to be relatively uncommon and there is little doubt that some of the earlier records of this species were due to misidentification of *A. walkeri*. An intensive study of the two species is being made by William Chalgren, a medical student. All four of the species occur in the region of the Twin Cities but in so far as our data indicate, *A. walkeri* is considerably more common.

It is significant that all of the clearly established cases of indigenous malaria in this state have occurred in the southern third, where *Anopheles punctipennis* is the most common species. I have personally collected the larvae in numbers at Rochester and from there south to the state line. Last August I found them in numbers in a tub in an auto camp near Winona. While this species is usually regarded as an indifferent carrier, King (1916) found that it was capable of maturing both the tertian and the aestivo-autumnal type of the parasite and Mizmain (1916) transmitted the tertian type to three volunteers by allowing experimentally infected mosquitoes of this species to feed on them. A number of workers have since confirmed these results. Infected specimens have been found in nature.

It must be recognized that very little intensive collecting has been done in the southern part of the state or, for that matter, in any section except the immediate neighborhood of the Twin Cities and that suggestions as to the significance of *A. punctipennis* are purely tentative.

The recognition of *A. walkeri* as a distinct species is relatively recent and still more recent is the demonstration by Matheson, Boyd and Stratman-Thomas (1933)

of the fact that it is capable of maturing and transmitting to man the organism of benign tertian malaria. There are no significant data to indicate whether it plays a role in the spread of malaria in nature but it readily attacks man and in collections of the past year in the neighborhood of the Twin Cities it constituted 78 per cent of the total catch of anophelines.

Since all available data indicate that *Anopheles maculipennis* and *A. quadrimaculatus*, the most efficient two vectors of malaria in the United States, are more commonly found in the northern part of the state the question naturally arises as to why indigenous malaria is confined largely to the southern third. The answer lies in the fact that Minnesota lies at about the northern limit of malaria the world over, a limit which is generally recognized as lying between the isothermal lines of 59°—61° F., mean summer temperature. In the United States the most malarious regions lie below the 80° F. isothermal line. Southern Illinois and Northern Missouri, where there is a moderate degree of benign tertian malaria have a mean summer temperature of 75°. In contrast to this, the records of the United States Weather Bureau show that in Minnesota the 65° isotherm is in the region of the Twin Cities, and extending north through the Red River valley to the northern boundary of the state. The mean summer temperature at Roseau is 62.9° F., at Duluth, 62.5° and at the eastern end of the Arrowhead it drops to 60°.

While there is abundant evidence that sporadic cases of malaria may originate in Minnesota, it is the imported case, in these days of widespread travel which is most likely to come to the attention of the Minnesota physician. Unfavorable climatic conditions, the short season with its relatively small population of anopheline mosquitoes, the few cases of human carriers which may infect the mosquitoes and the remote mathematical possibilities of just the right combination to insure transmission, all preclude the possibility of more than rare cases of indigenous origin. Such as do develop are much more likely to be in the southeastern part of the state.

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A New Approach to Psychotherapy in Chronic Alcoholism

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THE beginning and subsequent development of a new approach to the problem of permanent recovery for the chronic alcoholic has already produced remarkable results and promises much for the future. This statement is based upon four years of close observation. As this development is one which has sprung up among alcoholic patients themselves and has been largely conceived and promoted by them, it is felt that this new treatment can be reported freely and objectively.

The central idea is that of a fellowship of ex-alcoholic men and women banded together for mutual help. Each member feels duty bound to assist alcoholic newcomers to get upon their feet. These in turn work with still others, in an endless chain. Hence there is a large growth possibility. In one locality, for example, the fel-

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lowship had but three members in September 1935; eighteen months later the three had succeeded with seven more. These ten have since expanded to ninety.

It is much more than a sense of duty, however, which provides the requisite driving power and harmony so necessary for success. One powerful factor is that of self-preservation. These ex-alcoholics frequently find that unless they spend time in helping others to health, they cannot stay sober themselves. Strenuous, almost sacrificial work for other sufferers is often imperative in the early days of their recovery. This effort proceeds entirely on a good will basis. It is an avocation. There are no fees or dues of any kind, nor do these people organize in the ordinary sense of the word.

These ex-alcoholic men and women number about one hundred and fifty. One group is scattered along the Atlantic seaboard with New York as a center.

Another, and somewhat larger body, is located in the Middle West. Many walks of life are represented, though business and professional types predominate. The unselfishness, the extremes to which these men and women go to help each other, the spirit of democracy, tolerance and sanity which prevails, are astonishing to those who know something of the alcoholic personality. But these observations do not adequately explain why so many gravely involved people are able to remain sober and face life again.

The principal answer is: Each ex-alcoholic has had, and is able to maintain, a vital spiritual or "religious" experience. This so-called "experience" is accompanied by marked changes in personality. There is always, in a successful case, a radical change in outlook, attitude and habits of thought, which sometimes occurs with amazing rapidity, and in nearly all cases these changes are evident within a few months, often less.

That the chronic alcoholic has sometimes recovered by religious means is a fact centuries old. But these recoveries have been sporadic, insufficient in numbers or impressiveness to make headway with the alcoholic problem as a whole.

The conscious search of these ex-alcoholics for the right answer has enabled them to find an approach which has been effectual in something like half of all the cases upon which it has been tried. This is a truly remarkable record when it is remembered that most of them were undoubtedly beyond the reach of other remedial measures.

The essential features of this new approach, without psychological embellishment, are:

1. The ex-alcoholics capitalize upon a fact which they have so well demonstrated, namely: that one alcoholic can secure the confidence of another in a way and to a degree almost impossible of attainment by a non-alcoholic outsider.

2. After having fully identified themselves with their "prospect" by a recital of symptoms, behavior, anecdotes, etc., these men allow the patient to draw the inference that if he is seriously alcoholic, there may be no hope for him save a spiritual experience. They cite their own cases and quote medical opinion to prove their point. If the patient insists he is not alcoholic to that degree, they recommend he try to stay sober in his own way. Usually, however, the patient agrees at once. If he does not, a few more painful relapses often convince him.

3. Once the patient agrees that he is powerless, he finds himself in a serious dilemma. He sees clearly that he must have a spiritual experience or be destroyed by alcohol.

4. This dilemma brings about a crisis in the patient's life. He finds himself in a situation which, he believes, cannot be untangled by human means. He has been placed in this position by another alcoholic who has recovered through a spiritual experience. This peculiar ability, which an alcoholic who has recovered exercises upon one who has not recovered, is the main secret of the unprecedented success which these men and women are having. They can penetrate and carry conviction where the physician or the clergyman cannot. Under

these conditions, the patient turns to religion with an entire willingness and readily accepts, without reservation, a simple religious proposal. He is then able to acquire much more than a set of religious beliefs; he undergoes the profound mental and emotional change common to religious "experience". (See William James' *Varieties of Religious Experience*). Then, too, the patient's hope is renewed and his imagination is fired by the idea of membership in a group of ex-alcoholics where he will be enabled to save the lives and homes of those who have suffered as he has suffered.

5. The fellowship is entirely indifferent concerning the individual manner of spiritual approach so long as the patient is willing to turn his life and his problems over to the care and direction of his Creator. The patient may picture the Deity in any way he likes. No effort whatever is made to convert him to some particular faith or creed. Many creeds are represented among the group and the greatest harmony prevails. It is emphasized that the fellowship is non-sectarian and that the patient is entirely free to follow his own inclination. Not a trace of aggressive evangelism is exhibited.

6. If the patient indicates a willingness to go on, a suggestion is made that he do certain things which are obviously good psychology, good morals and good religion, regardless of creed:
 - a. That he make a moral appraisal of himself, and confidentially discuss his findings with a competent person whom he trusts.
 - b. That he try to adjust bad personal relationships, setting right, so far as possible, such wrongs as he may have done in the past.
 - c. That he recommit himself daily, or hourly if need be, to God's care and direction, asking for strength.
 - d. That, if possible, he attend weekly meetings of the fellowship and actively lend a hand with alcoholic newcomers.

This is the procedure in brief. The manner of presentation may vary considerably, depending upon the individual approached, but the essential ingredients of the process are always much the same. When presented by an ex-alcoholic, the power of this approach is remarkable. For a full appreciation one must have seen the work and must have known these patients before and after their change.

Considering the presence of the religious factor, one might expect to find unhealthy emotionalism and prejudice. This is not the case however; on the contrary, there is an instant readiness to discard old methods for new ones which produce better results. For instance, it was early found that usually the weakest approach to an alcoholic is directly through his family or friends, especially if the patient is drinking heavily at the time. The ex-alcoholics frequently insist, therefore, that a physician first take the patient in hand, placing him in a hospital whenever possible. If proper hospitalization and medical care is not carried out, this patient faces the danger of delirium tremens, "wet brain" or other complications. After a few days' stay, during which

time the patient has been thoroughly detoxicated, the physician brings up the question of permanent sobriety and, if the patient is interested, tactfully introduces a member of the ex-alcoholic group. By this time the prospect has self-control, can think straight, and the approach to him can be made casually, with no intervention by family or friends. More than half of this fellowship have been so treated. The group is unanimous in its belief that hospitalization is desirable, even imperative, in most cases.

What has happened to these men and women? For years, physicians have pursued methods which bear some similarity to these outlined above. An effort is made to procure a frank discussion with the patient, leading to self-understanding. It is indicated that he must make the necessary re-adjustment to his environment. His coöperation and confidence must be secured. The objectives are to bring about extraversion and to provide someone to whom the alcoholic can transfer his dilemma.

In a large number of cases, this alcoholic group is now attaining these very objectives because their simple but powerful devices appear to cut deeper than do other methods of treatment because of the following reasons:

1. Because of their alcoholic experiences and successful recoveries they secure a high degree of confidence from their prospects.

2. Because of this initial confidence, identical experience, and the fact that the discussion is pitched on moral and religious grounds, the patient tells his story and makes his self-appraisal with extreme thoroughness and honesty. He stops living alone and finds himself within reach of a fellowship with whom he can discuss his problems as they arise.

3. Because of the ex-alcoholic brotherhood, the patient, too, is able to save other alcoholics from destruction. At one and the same time, the patient acquires an ideal, a hobby, a strenuous avocation, and a social life which he enjoys among other ex-alcoholics and their families. These factors make powerfully for his extraversion.

4. Because of objects aplenty in whom to vest his confidence, the patient can turn to the individuals to whom he first gave his confidence, the ex-alcoholic group as a whole, or the Deity. It is paramount to note that the religious factor is all important even from the beginning. Newcomers have been unable to stay sober when they have tried the program minus the Deity.

The mental attitude of these people toward alcohol is interesting. Most of them report that they are seldom tempted to drink. If tempted, their defense against the first drink is emphatic and adequate. To quote from one of their number, once a serious case at this hospital, but who has had no relapse since his "experience" four and one-half years ago: "Soon after I had my experience, I realized I had the answer to my problem. For about three years prior to December 1934 I had been taking two and sometimes three bottles of gin a day. Even in my brief periods of sobriety, my mind was much on liquor, especially if my thoughts turned toward home, where I had bottles hidden on every floor of the house. Soon after leaving the hospital, I commenced to work

with other alcoholics. With reference to them, I thought much about alcohol, even to the point of carrying a bottle in my pocket to help them through severe hangovers. But from the first moment of my experience, the thought of taking a drink myself hardly ever occurred. I had the feeling of being in a position of neutrality. I was not fighting to stay on the water wagon. The problem was removed; it simply ceased to exist for me. This new state of mind came about in my case at once and automatically. About six weeks after leaving the hospital my wife asked me to fetch a small utensil which stood on a shelf in our kitchen. As I fumbled for it, my hand grasped a bottle, still partly full. With a start of surprise and gratitude, it flashed upon me that not once during the past weeks had the thought of liquor being in my home occurred to me. Considering the extent to which alcohol had dominated my thinking, I call this no less than a miracle. During the past four years of sobriety I have seriously considered drinking only a few times. On each occasion, my reaction was one of fear, followed by the reassurance which came with my new found ability to think the matter through, to work with another alcoholic, or to enter upon a brief period of prayer and meditation. I now have a defense against alcoholism which is positive so long as I keep myself spiritually fit and active, which I am only too glad to do."

Another interesting example of reaction to temptation comes from a former patient, now sober three and one-half years. Like most of these people, he was beyond the reach of psychiatric methods. He relates the following incident:

"Though sober now for several years, I am still bothered by periods of deep depression and resentment. I live on a farm, and weeks sometimes pass in which I have no contact with the ex-alcoholic group. During one of my spells I became violently angry over a trifling domestic matter. I deliberately decided to get drunk, going so far as to stock my guest house with food, thinking to lock myself in when I had returned from town with a case of liquor. I got in my car and started down the drive, still furious. As I reached the gate I stopped the car, suddenly feeling unable to carry out my plan. I said to myself, 'At least I have to be honest with my wife.' I returned to the house and announced I was on my way to town to get drunk. She looked at me calmly, never saying a word. The absurdity of the whole thing burst upon me and I laughed. And so the matter passed. Yes, I now have a defense that works. Prior to my spiritual experience I would never have reacted that way."

The testimony of the membership as a whole sums up to this: For the most part, these men and women are now indifferent to alcohol, but when the thought of taking a drink does come, they react sanely and vigorously.

This alcoholic fellowship hopes to extend its work to all parts of the country and to make its methods and answers known to every alcoholic who wishes to recover. As a first step, they have prepared a book called *Alcoholics Anonymous**. A large volume of 400 pages, it sets forth their methods and experience exhaustively, and

with much clarity and force. The first half of the book is a text aimed to show an alcoholic the attitude he ought to take and precisely the steps he may follow to effect his own recovery. He then finds full directions for approaching and working with other alcoholics. Two chapters are devoted to family relations and one to employers for the guidance of those who surround the sick man. There is a powerful chapter addressed to the agnostic, as the majority of the present members were of that description. Of particular interest to the physician is the chapter on alcoholism dealing mostly with its mental phenomena, as these men see it.

By contacting personally those who are getting results from the book, these ex-alcoholics expect to establish new

centers. Experience has shown that as soon as any community contains three or four active members, growth is inevitable, for the good reason that each member feels he must work with other alcoholics or perhaps perish himself.

Will the movement spread? Will all of these recoveries be permanent? No one can say. Yet, we at this hospital, from our observation of many cases, are willing to record our present opinion as a strong "Yes" to both questions.

*Editor's Note: The book, *Alcoholics Anonymous* (\$3.50) may be secured from The Alcoholic Foundation, Post Box 658, Church Street Annex, New York City.

Book Reviews

Clinical Pathological Gynecology, by J. THORNWELL WITHERSPOON, M.A. (Oxon.), M.D. (Johns Hopkins); formerly associate professor of experimental and pathological gynecology, Indiana University Medical Center, Indianapolis; octavo, 400 pages, illustrated with 271 engravings; Philadelphia: Lea & Febiger, 1939. Cloth, \$6.50, net.

This book is an effective introduction to clinical pathological gynecology based on the author's unusually successful teaching experience. In it the more common clinical diseases are studied in detail. This study is followed by clinical interpretations of the etiology, symptoms, signs, treatment and prognosis of each condition, presenting the pathological and clinical pictures of each disease. This combination of pathological and clinical relationship unifies the various gynecological disease entities. The text gives a thorough understanding of gynecological pathology and a comprehensive review of the clinical aspects of each pathological condition. It avoids the theoretical and to that end the discussion of embryology, congenital anomalies and the anatomy of the female pelvic organs, except for a few illustrations, is purposely omitted.

The text is an expression of organic gynecological pathology and its clinical applications. The material is arranged in anatomical locations rather than under similarity of diseases, thus, all pathological conditions related to the vulva are discussed under vulval lesions and those of the ovary under ovarian diseases. Infections and tumors pertaining to these locations are developed in the order named. The 271 engravings provide visual as well as verbal teaching. A clinical or gross specimen photograph and both magnified and microscopic photographs are provided for each disease that is studied. The pathological descriptions of the various conditions are described in the text. Most of the illustrations are original. No attempt has been made to present extensive bibliographies but the more important references are noted immediately after each gynecological disease. This work is an effective summary of the diagnosis and treatment of gynecological disorders. It is splendidly organized and is an effective and conservative guide in this field.

Practice of Medicine, by JONATHAN CAMPBELL MEAKINS, M.D., LL.D.; second edition, 1413 pages, 521 illustrations; St. Louis: C. V. Mosby Co., 1938. Price \$12.50.

The second edition of MEAKINS' excellent general textbook in the field of medicine contains many revisions, making this a most valuable general reference book. As Dr. MEAKINS says in the preface to this new edition: "Among the conditions which have been amplified or added are the following: acute laryngeal tracheo-bronchitis, tuberculous tracheitis, cyst of the lungs, Friedlander pneumonia, lipoid pneumonia, monocytic leukemia, nutritional edema, protamine zinc insulin, experimental nephri-

tis, vascular renal failure, congenital aplasia of the kidneys, uremic state, sulfanilamide therapy, lymphogranulomatosis inguinalis, epidemic pleurodynia, and cannabis indica intoxication." I quote this excerpt from the preface as some indication of the wide revision and modernization of the text which has taken place.

Many extremely valuable illustrations have been included in this edition.

One might wish the section on "Infectious Diseases" had been amplified somewhat. Likewise, the subject of allergy is treated in a very cursory manner. On the whole, this revised edition of *The Practice of Medicine* brings to the practitioner or medical student the latest scientific information in practically every field of medicine in a manner that is both easy to read and to understand.

Symptoms of Visceral Disease, by FRANCIS MARION POTTENGER, A.M., M.D., LL.D., F.A.C.P.; St. Louis: The C. V. Mosby Company, 1938. Price \$5.00.

This fifth edition since 1919 is a good indication of the popularity of Dr. Pottenger's book. He has spent a great deal of time on the subject of visceral disease and has made some valuable contributions to our knowledge of this subject.

The first chapter of the book is devoted to the evolution of modern medicine. Part I, containing chapters 2 to 7 inclusive, is a presentation of the vegetative nervous system.

Part II consists of chapters 8 to 15 inclusive, which deal with the relationship between the vegetative nervous system and the symptoms of visceral disease.

Part III is composed of twenty chapters dealing with the innervation of important viscera and including a clinical study of the more important viscerogenic reflexes.

The book contains eighty-seven excellent illustrations. It has a good index and contains much information of great value.

Pulmonary Tuberculosis in Adults and Children, by JAMES ALEXANDER MILLER, A.M., M.D., D.P.H., Sc.D., professor of clinical medicine, College of Physicians and Surgeons, Columbia University, and ARVID WALLGREN, head of the Children's Hospital, Gothenburg, Sweden; New York: Thomas Nelson & Sons, 1939. \$3.50.

Miller of New York and Wallgren of Gothenburg, Sweden, are physicians whose names have frequently appeared in the literature. Both have had wide experience in the field of tuberculosis. This volume consists for the most part of the chapters by Miller and Wallgren which are published in the Nelson Loose-Leaf *Medicine*.

The book includes discussions of tuberculosis in all of its phases from the time tubercle bacilli enter the body until the disease takes the life of the individual. This work of 193 pages contains an excellent list of references and a fine index. Every physician in this nation would profit greatly by reading it.

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VETERANS HOSPITAL

In the report of the Committee on Legislative Activities, presented at the recent session of the American Medical Association, it was pointed out that there were on June 30, 1938, in the Veterans Administration facilities, 51,991 hospital beds apportioned to different classes of patients.

During the fiscal year of 1939 it was proposed to add 3,453 new beds, and during the fiscal year of 1940 it was proposed to add 6,731 new beds, making a total, if the plans are carried out, of 62,175 beds in the Veterans Hospitals as of June 30, 1940.

The present hospital building program of the Administration is being carried out through the appropriation of \$4,575,000 made available directly by the Seventy-fifth Congress. But this is being supplemented by a sum three times as large, \$13,268,200, donated by the Public Works Administration. The Administrator of Veteran Affairs contemplates an ultimate goal of 100,000 beds in Veterans Hospitals, or one bed for every 40 veterans throughout the United States. He estimates that the

peak load will be reached by 1949 or 1950. What will become of these hospital facilities as the load declines is not clear.

In addition to the foregoing, House Bills authorizing a 500 bed hospital for Florida and a million dollar hospital for Eastern South Dakota have been introduced.

The recent report of the Council on Medical Education and Hospitals of the American Medical Association shows that in the United States there are 4,438 non-governmental hospitals with a bed capacity of 346,244, showing an average census of 229,019. This would seem to indicate that in the existing non-governmental hospitals there are available 115,000 beds. It would, therefore, seem that it would be much more to the point for the Veterans Administration to introduce legislation making it possible for them to use private facilities in the care of the veterans rather than add to our already staggering tax-burden for the building of more governmental hospitals which would in turn tend to make more empty beds in our private hospitals.

C. E. S.

HAIL TO OUR YOUTH

It was Victor Hugo, was it not, who said that every man was a radical at 25 and a conservative at 50? Whoever it was and whatever the exact ages were, the statement is expressive of a universal truth. Osler in his much misquoted statement about chloroforming at 60 gave voice to a kindred thought when he said that only comparatively young persons were capable of true inventions, that is, inventions requiring original thought.

The conservative deplors the rashness of youth and expresses fear that the consequence of youth's acts may upset the apple cart. Nevertheless, this good old world owes much of its progress to the trial-and-error method of youthful experimentation. The conservative keeps the radical within bounds, but we must admit that the radical gives us something to think about. True, stability is necessary, but it need not be absolute. There can be no advancement without some change.

We are not in sympathy with lamentations about our youth going to hell. That is not conservatism, that is pessimism; and pessimism is destructive. By giving voice to such expressions, we classify ourselves as old. Youth, we know, is not prejudiced by custom and usage. Youth thinks along new lines. Only youth will steer the bark out on uncharted seas. Let us stay young as long as we can.

A. E. H.

SOUTH DAKOTA NEW LAWS

On July 1, 1939, the new premarital and pregnant woman laws will become effective. These laws passed by the 1939 Legislature require that each applicant for a marriage license in South Dakota present a certificate from a licensed physician of the state showing that the applicant has had a standard laboratory test for the detection of syphilis and that in the opinion of the physician the applicant is not infected with the disease, or if so infected, is not in a stage of the disease which is or may later become communicable. Presentation of such a certificate to the Clerk of Courts before a license to marry is required unless the woman is now pregnant and infected with syphilis. If such is the case she must present a certificate from a physician stating that she is pregnant.

The pregnant woman law is as follows: "27.2406. Pregnant women: blood test to be made. (1) Each physician attending a pregnant woman in this state during gestation shall, in the case of each woman so attended, take or cause to be taken a sample of blood of such woman at the time of the first examination, and submit such sample for standard serological tests for syphilis to the state health laboratory of the state board of health or such other laboratories cooperating with and approved by the state board of health. Every other person permitted by law to attend upon pregnant women in the state but not permitted by law to take blood tests, shall cause a sample of the blood of such pregnant woman to be taken by a duly licensed physician and submitted for standard serological tests for syphilis to the state hygienic laboratory of the state board of health or such other laboratories cooperating with and approved by the

state board of health. Such tests as may be made by the state health laboratory of the state board of health shall be free of charge. The result of all laboratory tests shall be reported on standard forms prescribed and furnished by the state board of health. (2) In reporting every birth and stillbirth, physicians and others permitted to attend pregnancy cases and required to report births and stillbirths shall state on the birth certificate or stillbirth certificate, as the case may be, whether a blood test for syphilis has been made during such pregnancy upon a specimen of blood taken from the woman who bore the child for which a birth or stillbirth certificate is filed, and if made, the date when such test was made, and if not made, the reason why such test was not made. In no event shall the birth certificate state the result of the test."

Each County Clerk of Courts will be furnished the necessary forms and instructions. No license to marry can be issued without the physician's certificate for both parties. The procedure to procure a physician's certificate to marry is very simple. Both applicants for license to marry must call on their family physician, not more than twenty days prior to the issuance of the license. The physician takes a sample of blood which he sends to any one of the laboratories designated by the State Board of Health to make the blood or serological test. When the tests are completed the laboratory makes a confidential report to the physician for his private files. If, in the opinion of the physician the applicant is free from this disease, he may issue a certificate of health which the applicant presents to the Clerk of Courts and signs in the presence of the Clerk.

Copies of these laws may be secured from the State Board of Health, Pierre, South Dakota.

J. F. D. C.

CHARLES HORACE MAYO

Dr. Charlie is asleep. There are no words to assuage the grief, personal and universal. His Family and his Church will this day tenderly commit the mortality of his body to the good earth and the immortality of his great spirit to the memory of his friends and comrades throughout the world.

There was ever no man worthier in life and none was greater in death. He crashed the mortal gates rich in honors and achievement after half a century of matchless service to humanity. None has carried his high office with greater professional integrity and efficiency in this amazing generation; none has adorned it with finer human excellence. He was a "friend of man."

He will live forever in the hearts of the countless sick bodies he has mended and in the broken spirits he gave new hope. Together with his illustrious brother, Dr. Will, he has left an enduring impress upon the medical profession. He is Minnesota's greatest contribution to America. Ten years ago in an international survey he was nominated among the seven greatest personalities in the world. With our Lincoln, he belongs to the Ages.

Dr. Charlie is not dead; his great spirit marches on.

O. J. H.

Charles Horace Mayo

Dr. Charles Horace Mayo was born on July 19, 1865, at Rochester, Minnesota, and was the younger son of Dr. William Worrell Mayo, who came from Eccles in Lancashire, England, studied chemistry at Owens College and medicine at the University of Missouri, and finally established himself in medical practice in Rochester in 1863.

Dr. Charles Mayo was graduated from the Rochester High School, attended Nile's Academy, and in the autumn of 1885 entered the Chicago Medical College, which was affiliated with Northwestern University. In 1888 he was awarded the degree of Doctor of Medicine by that institution, and the following year he did post-graduate work at the New York Polyclinic Medical School. In 1890 he attended the New York Post-Graduate Medical School.

"It is characteristic," wrote Professor J. R. Learmonth,¹ Regius professor of surgery in the University of Aberdeen (Scotland) from 1932, until he succeeded the late Sir David Wilkie at Edinburgh, "that his first six contributions to medical journals dealt with such varied subjects as glandular tuberculosis, cerebral surgery, nasal sinusitis, injuries of nerves, skin-grafting, and obstruction of the common bile-duct. In all he wrote or shared in 413 papers of professional interest; although in his later life he narrowed the field of his technical interest, he maintained the same broad outlook on surgery in general, and his contributions were always characterized by clarity and proper perspective."

For many years Dr. Mayo did much of the orthopedic surgery performed at Rochester; he also did many operations for cataract and in the field of otorhinology and plastic surgery. His name has been given to an operation for varicose veins, a type of vaginal hysterectomy, and to a procedure for the relief of bunions. One of his outstanding surgical achievements was his adaptation of Coffey's technic for transplantation of the ureters for exstrophy of the bladder. He was a pioneer in evolving various technics for the surgical treatment of the thyroid gland.

Keenly interested in education, Dr. Mayo was a trustee of both Northwestern University and Carleton College, and was the founder, with his brother, William J. Mayo, of the Mayo Foundation for Medical Education and Research, now an integral part of the University of Minnesota. Dr. Mayo held the rank of professor of surgery in the Foundation.

The lifelong association of Charles and William Mayo was expressed in 1931 by William J. Mayo, on the occasion of the elder brother's seventieth birthday anniversary. Speaking of his younger brother, Dr. William J. Mayo² told members of the American Surgical Association: "Something more than four years younger, Charlie

has stimulated me by precept and example, and our association has been unique not only in the love and confidence we have for each other, but in having made an opportunity for two men to work as one and to share equally such rewards as have come. Even to this day, not only have our fraternal contacts been maintained, but also our habit of having a common pocketbook, in which each has wanted the other to have the greater share. And with due regard to the statement of a truth, my brother, Charles H. Mayo, is not only the best clinical surgeon from the standpoint of the patient that I have ever known, but he has that essential attribute of the true gentleman, consideration for others."

A former surgical assistant of Dr. Mayo's, Mr. A. H. McIndoe,³ now resident in England, wrote: "Few there were who after five minutes' conversation did not fall beneath the spell of those twinkling eyes set in a half-serious, half-humorous face, of the quiet voice with its characteristic dry twang and the head cocked a little on one side. His method of expression was unforgettable. He presented facts and figures in forthright manner with apt illusions and illustrations drawn from natural history and comparative anatomy, sometimes germane to the point under discussion, sometimes not. He illuminated his picture with flashes of dry humor which kept his audience in a bubble of anticipation."

Foreign governments and universities throughout the world bestowed honors on Dr. Mayo. He was president of the Western Surgical Association (1904-1905); Minnesota State Medical Association (1905-1906); the Section on Surgery of the International Congress on Tuberculosis (1908-1909); the Society of Clinical Surgery (1911-1912); the Clinical Congress of Surgeons of North America (1914-1915); the American Medical Association (1916-1917); the American College of Surgeons (1924-1925); the American Surgical Association (1931-1932); the Section on General Surgery of the Panamerican Medical Association (1932-1934); the Minnesota Public Health Association (1932-1936; honorary president for life after 1936); and of the Interstate Postgraduate Medical Association of North America (1933-1934).

Dr. Mayo died of pneumonia at Mercy Hospital, Chicago, on May 26, 1939. He lay in state in the main lobby of the Mayo Clinic on Sunday, May 28; and funeral services were conducted at Calvary Episcopal Church in Rochester on Monday, May 29, 1939.

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Charles Horace Mayo
1865-1939



Societies

SCIENTIFIC PROGRAM OF THE MINNEAPOLIS CLINICAL CLUB

Nineteenth Anniversary Meeting, January 12, 1939
H. M. N. Wynne, M.D., Presiding

SOME RECENT ADVANCES IN GENERAL SURGERY

WILLARD D. WHITE, M.D.
MINNEAPOLIS, MINNESOTA

My part in the program this evening is to mention and discuss briefly some of the recent advances in general surgery. In the brief time allotted we could mention as many as possible of the subjects in this classification. If we merely mentioned these without any discussion, we would be much like the man and his wife who were making a tour of Europe visiting as many points of interest as possible such as historical sites, cathedrals, art galleries, etc. As they hurried through one of the art galleries, the man stopped before a painting he had heard about and which he wished to really examine carefully. As he did so his wife grabbed him by the arm and said, "Come on, dear, don't stop to look at anything or we will not see everything."

Therefore it might be profitable to stop at least a moment or two at one or two points as we enumerate the different subjects.

STORING OF BLOOD FOR EMERGENCY PROCEDURES

Stored blood of cadavers has been used for transfusions in Europe and especially in Russia and has been used even when it has been stored for as long as three weeks at a temperature of 17 to 20 degrees C. There are differences in the behavior of blood from cadavers and that of fresh blood taken from living persons in respect to coagulation. Blood from living persons will clot unless it is mixed with an anticoagulant, whereas blood taken from the bodies of individuals who have died suddenly, from gunshot wounds, acute trauma, apoplexy, coronary disease or electric shock will form a coagulum at first but after 15 minutes to an hour the coagulum dissolves and the blood becomes liquid once more. This phenomenon of fibrinolysis can be accelerated by heating or shaking. The mechanism is not entirely understood, since blood collected from individuals who have expired from such wasting diseases as tuberculosis, carcinoma, etc., does not exhibit this phenomenon and when this blood coagulates, it does not again become liquid.

The blood is obtained from the jugular vein soon after death. No anticoagulant is added to the blood which remains fluid after withdrawal. A complete postmortem examination is made. The blood is tested for syphilis. It is grouped and stored until ready to be used. So far as I know this has not been used, at least to any extent, in the United States.

A so-called blood bank is however quite generally used, particularly in the larger hospitals. Here the blood is obtained from living persons. It is grouped, tested and stored in the ice box until its use is demanded. It is then available for use on very short notice. It merely requires cross matching with the individual patient and warming it up to about body temperature. When one bottle is taken out from the "blood bank" another is replaced by the same service that uses it, thereby maintaining a constant supply. A blood bank is especially useful in large hospitals where there is much emergency work and ordinarily blood from the bank is taken out and new blood put in. However, if it is preferred, the blood can be taken, of course, from a donor directly as has been done usually heretofore.

THE NATURE OF BLEEDING IN JAUNDICE

This subject has been studied and discussed a great deal recently. An excellent discussion was published by A. J. Quick of Milwaukee in the *Journal of the American Medical Associa-*

tion, May 14, 1938, volume 110, page 1658. The following is for the most part taken from that article.

It has been realized that the occurrence of bleeding in jaundice patients cannot be predicted with any degree of certainty either clinically or by means of the common laboratory methods which have been in general use up until recently. The phenomenon of clotting might be expressed somewhat as follows:

- (1) Prothrombin + thromboplastin + calcium = thrombin.
- (2) Fibrinogen + thrombin = fibrin, which is the clot.

Therefore, a deficiency of any one of these factors required for the formation of thrombin or the absence of marked depletion of fibrinogen will cause a retardation or even a complete inhibition of clotting. Without going into the details of the investigation it suffices to say that the evidence now has indicated that the fault lies in a deficiency of the prothrombin. Until recently no satisfactory method for determining prothrombin and thromboplastin were available. A method was devised which is dependent on the observation at the clotting time of oxalated plasmas, when mixed with an excess of thromboplastin and an optimum amount of calcium can be employed as a direct measure of the prothrombin content of the plasma. In other words, by keeping thromboplastin and calcium constant the rate of coagulation is dependent on the concentration of prothrombin and can therefore serve as a simple and direct means for determining this important clotting factor in blood.

The prothrombin concentration of human blood was found to be remarkably constant in normal persons. Significantly, the prothrombin was found quantitatively the same in hemophilic blood as in healthy subjects. While a normal prothrombin was also found in the majority of jaundiced patients a certain number showed a definite and in a few instances a drastic reduction of this clotting agent. Evidence has now been obtained which clearly shows that a close relationship exists between prothrombin deficiency and the severity of the bleeding tendency in jaundice. It was found that by avitaminosis (vitamin K deficiency) that a hemorrhagic disease could be produced in chicks. This was done by means of a diet deficient in a new food accessory which has been named vitamin K or koagulation vitamin. A diet which was complete except for an adequate amount of vitamin K was given to chicks and a diminution in prothrombin resulted quite promptly and a definite hemorrhagic tendency was invariably observed. Small amounts of alfalfa, a food particularly rich in the new vitamin, promptly restored the prothrombin to the normal level and cured the hemorrhagic condition.

In sections of the country in which sweet clover is used as fodder, it is well known that if this hay is spoiled during curing it is apt to cause a hemorrhagic disease. Heavy losses due to hemorrhage following simple procedures, such as dehorning cattle and castrating bull calves have occurred in this country and in Canada. It was observed that the hemorrhagic tendency ran parallel to the decrease in prothrombin. It is of clinical interest that a transfusion with citrated blood promptly elevated the prothrombin of the blood and produced a temporary improvement in the hemorrhagic condition. After twenty-four hours, however, the prothrombin had sunk again to the previous low level. The disease is easily treated, since merely stopping the feeding of the spoiled hay and substituting alfalfa meal promptly cures the hemorrhagic condition. This suggests that the toxin of sweet clover hay exerts its depressing action on prothrombin directly rather than by causing severe organic injury to any organ such as the liver and thereby impairing its power to synthesize prothrombin.

INJURY TO THE LIVER

The tendency to hemorrhage following severe parenchymal damage to the liver has long been recognized. This bleeding also appears to be dependent upon a reduction of prothrombin. An experimental animal can be subjected to chloroform anesthesia for a long enough time to produce liver damage and there will be found a prothrombin deficiency. Carbon tetrachloride when given orally can also produce a prothrombin deficiency. Irrespective of the cause for the drop of prothrombin, no serious bleeding was observed until the prothrombin of the blood was reduced to a markedly low level, that is, below 10 per cent of the normal in human and even lower in rabbit blood.

There is obviously a wide margin of safety in the prothrombin factor and significantly the coagulation time as measured by the usual method may remain normal until more than 80 per cent of prothrombin of the blood is lost. The coagulation time is very little prolonged until the prothrombin drops to 20 per cent, and only below this level does the time of clotting rapidly increase with further reduction of prothrombin. It is frequently observed that a jaundiced patient just before operation shows no tendency to hemorrhage either clinically or by laboratory tests but nevertheless has serious bleeding soon after operation. Perhaps in many of these cases a decreased prothrombin concentration exists which is not sufficient to bring the patient into the hemorrhagic zone but enough to exhaust the margin of safety. The converse condition is also fortunately true. The patient with concentration of prothrombin so low that clotting is very defective is strikingly benefitted by even a small transfusion. By restoring only a fraction of the prothrombin, the concentration is often sufficiently raised to bring the prothrombin to a level at which normal clotting occurs. In sweet clover disease it was found that a transfusion was of but temporary benefit for if the feeding of toxic hay was continued the prothrombin rapidly decreased again. Similarly in the bleeding of the jaundiced patient, transfusions usually are of only temporary effectiveness.

Clinical observations may be confusing. Icterus itself cannot be the cause of bleeding while only a small percentage of jaundiced patients bleed or will show any hemorrhagic tendency. It is well known that a deeply jaundiced patient shows no abnormal hemorrhagic tendency and has no postoperative bleeding. On the other hand patients with a biliary fistula having no evidence of jaundice may have severe hemorrhage. Rather than blaming jaundice as the cause of bleeding, it seems much more logical to recognize the possibility that often the two may be resultant of but one and the same agent. Thus carbon tetrachloride will cause both an intrahepatic type of jaundice and a fall of prothrombin.

The discovery that a food accessory, that is, a fat soluble vitamin, is required by the organism for the synthesis of prothrombin is of special importance. Hemorrhage has been observed in patients with biliary fistula as well as in animals in which the fistula was experimentally produced. There is evidence to show that the depletion of prothrombin may be due to the absence of bile acids in the intestinal tract, thus causing a faulty absorption of vitamin K. Bile probably acts as a carrying agent for the vitamin across the intestinal tract.

MANAGEMENT OF THE JAUNDICED PATIENT

Irrespective of the causes of jaundice, several helpful suggestions can be made for the treatment of the jaundiced patient particularly with regard to the prevention of hemorrhage. The hippuric acid test may furnish valuable information as to the liver function. If it is reduced much below 50 per cent of the normal the patient is apt to be a poor surgical risk. The use of dextrose is well recognized and the administration of gelatin has been recommended because of its high content of aminoacetic acid. The direct determination of prothrombin offers an advantage and helps in forming a prognosis and in making a guide in combating hemorrhage. If a prothrombin deficiency is found, effort should be made to restore the level of this clotting factor to a course that assures normal clotting. Administration of vitamin K either in the form of powdered alfalfa leaf or an extract is indicated. One should also administer bile, bile acids or desoxycholic acid, to assist in the absorption not only of vitamin K but of vitamins A and D as well. If injury to the liver is present, dextrose, gelatin or aminoacetic acid, calcium and viosterol are the chief therapeutic agents available. If the prothrombin concentration of the blood is below 15 per cent the only prompt and effective treatment is transfusion. It must be emphasized, however, that the benefit from the transfusion is only temporary. In patients with an external biliary fistula, the bile may be collected and given to the patient by having him swallow it or by introducing it through a stomach tube. Vitamin K is prepared from alfalfa but apparently it is more practical commercially to prepare it from a fish meal which is allowed to putrify and the vitamin K is found in the oily residue after it is extracted with ether.

INTUBATION STUDIES OF THE SMALL INTESTINE

Abbott and Johnston reported in *Surgery, Gynecology and Obstetrics*, volume 56, April 1938, page 691, about their studies in intubation of the small intestine. The local treatment of intestinal obstruction consists of (1) reducing the dispersion of the gut proximal to the lesion, (2) locating and relieving the obstruction and (3) excising any gangrenous tissue devitalized by disturbance of its blood supply. A double lumen tube is introduced through the patient's nose. Attached to one lumen of this tube is a collapsed balloon and to the other lumen is a duodenal bucket. The patient is taken to the fluoroscopy room. He lies on his right side. When it can be seen that the end of the tube has entered the duodenum, a volume of about 30 cc. of air is injected into the balloon while transient suction is maintained on the larger tube. As the gas and fluid are sucked out of the gut, the intestinal wall contracts and regaining their normal propulsive movement, they force the balloon ahead. The suction likewise collapses the intestine, loop by loop as the tip of the tube advances until the obstruction is reached, by which time release of the distension and relief of pain is obtained.

In cases in which organic obstruction is suspected, diagnostic measures may now be undertaken. The injection of a small amount of barium sulphate in dilute suspension will frequently indicate that the point of constriction on the pattern of the intestinal mucosa. The aspirated contents may be examined. When the situation warrants, the balloon can be deflated and withdrawn by gentle traction.

In a normal individual the apparatus will advance along the intestine at the rate of about 1 centimeter per minute or 2 feet an hour. A length of 6 or 8 feet of tubing is generally enough to reach from the pylorus to the cecum, 8 to 10 feet beyond the teeth. In obstructed cases the tube advances about a foot an hour. It is important that the tube be marked at 6 inch intervals so that the patient and the nurse may be given a schedule to insure correct speed of swallowing; a coil in the stomach from too rapid passage will sometimes check its advance.

SURGERY OF THE COLON

Sir Hugh Devine from Melbourne, Australia, published in *Surgery*, February, 1938, page 165, an excellent article on what he called "Operation on a Defunctioned Distal Colon." The main point of the article is that with proper preparation of the patient who requires surgery of the colon, the mortality and morbidity can be very greatly reduced. This preparation consists essentially of preliminary colostomy either in the mid portion of the transverse colon or near the hepatic flexure. A double barrel colostomy is done according to a definite technic and none of the fecal current passes over into the distal segment. The distal part of the colon then can be emptied by irrigation both from above and below and at the proper time the surgical procedure can be carried out. With such preparation a much better type of operation can be done on the lesion itself. A sutured anastomosis can be safely accomplished on this defunctioned colon and after the anastomosis is healed, fecal current can be reestablished by closing the colostomy. This is an excellent article and should be read by those interested in this branch of surgery.

E. T. EVANS, M.D.

Dr. Evans reviewed the development of reconstruction surgery for the rehabilitation of the ununited fracture of the neck of the femur. As a recent advance in this type of surgery he presented one of nine cases on which the McMurray trochanteric osteotomy had been performed.

NOTES ON SOME RECENT ARTICLES OF MEDICAL INTEREST

C. A. MCKINLAY, M.D.
MINNEAPOLIS, MINNESOTA

It is obvious that there has been an increased emphasis upon nutritional deficiency diseases. Those who have read that delightful narrative of the sea of one hundred years ago, *Two Years Before the Mast*, by Dana, will recall that on the last

lap of the journey around Cape Horn from California they were hastening homeward with full sail; for, beside the natural desire to get home after an absence of two years, scurvy had begun to show itself on board. "One of the crew was in a dreadful state. His legs swelled and pained him so that he could not walk, his flesh lost its elasticity so that if it were pressed it would not return to its shape and his gums swelled until he could not open his mouth. His breath, too, became offensive; he lost all strength and spirit, could eat nothing; and grew worse every day and could not long survive." Hailing a passing ship, the crew obtained fresh provisions, potatoes and onions, for which they were perfectly ravenous. "It was like a scent of blood to a hound." The one of the crew with severe scurvy was given at the start the juice of raw potatoes until he was able to eat. So rapid was his recovery that in ten days he was at the masthead furling sails. It is of interest in the day of manufactured vitamin products that high grade vitamin deficiency was cured simply by the addition of potatoes and onions. It would seem that deficiencies with minimal manifestations should respond to adequate diet of protective foods irrespective of the use of supplemental vitamin combinations. One hundred years after this journey taken as an illustration of scurvy at sea, cevitamic acid, thiamin chloride and other vitamins, the substances lacking in salt provisions, have been synthesized in crystalline form.

Wright, in considering cevitamic acid, notes that deficiency may exist under a variety of conditions, where the intake is adequate, as in the infections, in conditions with increased metabolism and where there is interference with absorption and utilization from the gastrointestinal tract. Scurvy is considered to be a late symptom of vitamin C deficiency. Abt and Farmer note that there have been numerous suggestive reports of the role of vitamin C in the infectious diseases, but that the evidence is not clear-cut. They note that an ample diet has long been recommended in febrile conditions.

Williams and Spies recount that vitamin B₁ appears to play a part in the metabolism of every living cell, plant and animal; that the nervous manifestations of beriberi are merely the extreme evidence of a lack which is equally felt in all tissues, that the vitamin requirements are proportional to the non-fat contents of the diet, that vitamin concentrates are so variable in B₁ content that thiamin chloride, always of known potency, be used where B₁ is indicated.

Minot, in an excellent article on nutritional deficiency, emphasizes that the greater the chemical activity the more rapid is the depletion of these substances. If the ratio of vitamin B₁ intake in units to caloric intake, as shown by Cowgill, is lessened, deficiency is more liable to occur as is well illustrated by the addition of one pint of whiskey daily which, by adding 1600 calories without other food elements, lessens the ratio and increases the liability to neuritis. The reduction of this ratio may likewise occur as in the case reported by Minot with overeating chiefly of carbohydrates and fat, with development of B₁ deficiency neuritis relieved simply by weight reduction from dietary control. Jolliffe notes that beriberi in the United States is usually classified as alcoholic, gestational, diabetic, metabolic, or gastrogenous neuritis. One-third of their subjects with polyneuritis had cardiovascular disturbances. Frazer and Ravdin, in a study of the preoperative management of hyperthyroidism, noted that following the addition of thiamin chloride and brewers yeast daily, improvement occurred to the degree that the pulse rate was reduced, that the patients gained weight, and that the length of time for preparation was shortened compared to the control group. With regard to the growth promoting factor of the vitamin B complex, the dramatic results reported

by Matthews in pellagra after the use of nicotinic acid should be mentioned. Snell and co-workers have reported the beneficial effect of vitamin K combined with bile salts in the treatment of the hemorrhagic diathesis in jaundice.

Conservative notes have been struck by critical observers with regard to focal infection and systemic disease. Ash studied the influence of tonsillectomy on the course of rheumatic infection in 522 children observed during a 14-year period and noted that neither the presence or absence of tonsils at the time of the initial infection nor the removal of the tonsils subsequent to the onset had any demonstrable influence on the incidence of cardiac involvement or death rate. Cecil and Angevine reported a study of over 200 cases of rheumatoid arthritis in which chronic foci of infection, when found, were eradicated without demonstrable benefit and concluded that chronic foci played a comparatively unimportant role. They state that the time has come for complete reevaluation of the focal infection theory. Reimann states that he has attacked the theory of focal infection pertaining to tonsils and teeth in each of the three annual reviews of infectious diseases.

The controlled study by Diel and co-workers of mixed vaccines in the prevention of the common cold has shown that vaccines given orally were without value and that subcutaneously the reduction in the incidence of only 25 per cent would not justify their use. The importance of studies in prevention is realized when we are reminded that most of the illnesses of man are of the respiratory tract with the common cold heading the list.

A new preparation of sulfanilamide, a pyridine derivative, is being studied and has had some clinical use in pneumonia. Marshal and co-workers have recently reported that this compound is toxic to laboratory animals and advise against its use for purposes for which sulfanilamide has been shown to be effective. A report by Waghelstein shows the striking results in meningococcus infection in which, with combined sulfanilamide and serum therapy, the mortality rate was reduced to 12 per cent. Good results continue to be reported in the hemolytic streptococcus infections. Toxic effects following sulfanilamide, chiefly in the realm of the hematopoietic system continued to be reported, such as agranulocytosis with fatal results. Fatalities have also occurred with toxic hepatitis and acute atrophy of the liver. Toxic psychoses are not rare. Watson believes that there is evidence of blood destruction in a high percent of patients receiving full therapeutic doses. Lockwood and co-workers studied the mode of action of sulfanilamide and conclude that its striking effect is depression of the invasive properties of the organisms. The bacteriostatic effect has been shown to be dependent upon the presence of leucocytes.

Eklund and Blumstein report that six cases of human encephalitis occurred in Minnesota in 1937 in one county, where equine encephalomyelitis was prevalent. Riley states that the epidemiological evidence indicates that insect vectors (mosquitoes and possibly other arthropods) play a role in the spread of encephalomyelitis to animals and to man. Tyzzer and co-workers suggest that the main proliferation and dissemination are by migratory birds. They isolated the virus from pheasants and other birds in Connecticut. They state that it may be seriously questioned whether the horse or other domestic animals play any essential role in the perpetuation of this disease.

With regard to the common use of cigarettes, it is of interest that Hines and Roth have noted, after a standard test of smoking two cigarettes, elevation of blood pressure in a majority of individuals. Excessive rises were noted only in individuals who had hyperactive vascular systems.

News Items

Dr. Samuel Werner of Chicago has opened an office in Billings, Montana. Dr. Werner is a native of Billings.

Dr. B. J. Hughes, a graduate of the University of Minnesota Medical School, 1937, is now practicing in Rolla, North Dakota.

Dr. E. W. L. Rich, formerly of Grand Island, Nebraska, is now practicing in Billings, Montana.

Dr. J. F. Quinn of Waubay, South Dakota, has moved to New Effington, South Dakota.

Dr. W. H. Bodestab, Bismarck, is the new medical adviser for the North Dakota Workmen's Compensation bureau. He succeeds Dr. F. B. Strauss, also of Bismarck.

Dr. C. H. Sherman, formerly of Oakes, North Dakota, has moved to Bayport, Minnesota, where he is associated with Dr. E. V. Strand.

Dr. Charles E. Nagel has resumed his practice in Great Falls, Montana. He was recently admitted to the International College of Surgeons.

Dr. G. G. Sale, of Missoula, assistant health service physician at Montana State University, has resigned to accept a residency in otolaryngology at the Minneapolis General Hospital. He had been on the University staff for two years.

The lives of at least fifteen North Dakota babies have been saved during the past four months as a result of the new incubator program launched by the state medical association in coöperation with the University of North Dakota and the state department of health. This estimate was made by Dr. John H. Moore, chairman of the medical association's committee on maternal and child welfare.

The University of Wisconsin Medical School will conduct an *Institute for the Consideration of the Blood and Blood-Forming Organs*, September 4 - 6, 1939. The program will include papers and round-table discussions by European and American workers in the field of hematology. A detailed program may be obtained by addressing Dr. Ovid O. Meyer, Chairman of Program Committee, University of Wisconsin Medical School, Madison, Wisconsin.

Judge Vince A. Day, Minneapolis, was elected president of the Minnesota Association for Crippled Children and Disabled Adults, and its affiliate, Lone Craftsmen, at the annual board meeting held in June.

The Flathead County (Montana) Medical society held its annual dinner meeting June 8, 1939, at Kalispell. Problems confronting the medical profession in the state were discussed by D. J. C. MacGregor, Great Falls; Dr. Harold W. Gregg, Butte, and Dr. Thomas L. Hawkins, Helena.

Dr. L. W. Katzberg of Fergus Falls, Minnesota, is now practicing in Spring Valley, Minnesota.

Dr. Charles E. Lyght, Director of the Student Health Service at Carleton college, Northfield, Minnesota, gave the principal address at the annual Carleton cap and gown day service recently. He was chosen, according to custom, by vote of the senior class.

Dr. Francis Chermak has become associated with Dr. R. F. Werner in International Falls, Minnesota. Dr. Chermak, a graduate of the University of Minnesota Medical School, is a former resident of Proctor, Minnesota.

Dr. E. J. Kaufman has returned to Appleton, Minnesota, where he has resumed the practice of medicine in the firm of Drs. Kaufman & Kaufman.

Dr. I. L. Mitby, formerly of Hibbing, is now located in Aitkin, Minnesota, where he has taken over the practice of Dr. B. W. Kelly.

Dr. W. A. Fansler, Minneapolis, recently addressed the following medical societies on the subject of rectal diseases: St. Croix County, New Richmond, Wisconsin; Wright County, Monticello, Minnesota; Richland County, Wahpeton, North Dakota. Dr. J. K. Anderson, also of Minneapolis, spoke on the same subject before the following: Nebraska State Medical Association; Lyon-Lincoln County medical society, Marshall, Minnesota; East Central Minnesota medical society, Pine City.

Pre-school age children of Dillon, Montana, received free physical examinations at the annual summer round-up sponsored by the Dillon Parent-Teacher association last month.

Necrology

Dr. Benjamin W. Kelly, 65, of Aitkin, Minnesota, died at his home June 4, 1939. He had practiced in Aitkin for 40 years.

Dr. A. H. Thornton, 65, of Edgemont, South Dakota, died May 22, 1939.

Dr. George Grant, 65, of Wishek, North Dakota, died May 20, 1939. Dr. Grant had practiced in south-central North Dakota for the past 35 years.

Dr. James Christian Figenshau, 65, of Billings, Montana, died June 13, 1939. Born at Eau Claire, Wisconsin, Dr. Figenshau spent his boyhood in Grand Forks, North Dakota. Before coming to Billings, eight years ago, he had practiced in Miles City.

Dr. Harold F. Neilsen, 34, of Minneapolis, Minnesota, died May 23, 1939. A graduate of the University of Minnesota Medical School, Dr. Neilsen had practiced in Minneapolis since 1932.

Dr. E. E. Cress, 54, of Boyd, Minnesota, died May 14, 1939. A graduate of Northwestern University, Dr. Cress at one time practiced in Woodworth, North Dakota.

Dr. H. H. Thompson, 54, of Minneapolis, Minnesota, died May 22, 1939.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON MAY 11, 1939
BY EXAMINATION

Name	School	Address
Balmer, Albert Irwin	U. of Minn., M.B. 1938	Pipestone, Minn.
Baumann, Milton Charles	U. of Ill., M.D. 1937	No. Mich. Tb. San., Gaylord, Mich.
Beach, Northrop	Harvard Med. Col., M.D. 1938	University Hospital, Minneapolis, Minn.
Berry, Maxwell Rufus, Jr.	Cornell U., M.D. 1935	Mayo Clinic, Rochester, Minn.
Blair, Herbert Milton	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
Braun, Ohrmundt Carl	U. of Minn., M.B. 1939	Mpls. General Hospital, Minneapolis, Minn.
Campbell, Lorne Alexander, Jr.	U. of Minn., M.B. 1938	Eloise Hospital, Eloise, Mich.
Chapman, Asher Spaford	Northwestern, M.B. 1937, M.D. 1938	Mayo Clinic, Rochester, Minn.
Chlad, Arnold Joseph	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
Clarke, Eric Kent	U. of Toronto, M.B. 1916	University Hospital, Minneapolis, Minn.
Clegg, Reed Smoot	Northwestern U., M.B. 1936, M.D. 1937	Mayo Clinic, Rochester, Minn.
Dahle, Manford Benjamin	Rush Med. Col., M.D. 1938	Asbury Hospital, Minneapolis, Minn.
Dressel, Paul Arthur	U. of Minn., M.B. 1939	Elkton, S. Dak.
Eginton, Charles Theodore	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
Erickson, John Walfred	Creighton U., M.D. 1938	Swedish Hospital, Minneapolis, Minn.
Even, Martin Morris	U. of Minn., M.B. 1939	616 N. 18th Ave. E., Duluth, Minn.
Geib, Marvin Jacob	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Giles, Francis Emmett	U. of Minn., M.B. 1938	Nashwauk, Minn.
Greathouse, John Dallas, Jr.	U. of Minn., M.B. 1939	5042 Colfax Ave. S., Minneapolis, Minn.
Griffin, Vernon M.	U. of Ore., M.D. 1938	Ancker Hospital, St. Paul, Minn.
Gullickson, Miles Justin	U. of Minn., M.B. 1934, M.D. 1935	4212 Lyndale Ave. S., Minneapolis, Minn.
Hartman, Jack	U. of Minn., M.B. 1939	704—15th Ave. S. E., Minneapolis, Minn.
Hill, John Roger	Ohio State U., M.D. 1936	Mayo Clinic, Rochester, Minn.
Howe, Rulon Fullmer	U. of Chicago, M.D. 1937	Mayo Clinic, Rochester, Minn.
Huebner, Jewel Steiner	U. of Wis., M.D. 1938	St. Luke's Hospital, Duluth, Minn.
Johnson, Raymond Alfred	U. of Minn., M.B. 1939	Winthrop, Minn.
Johnson, Vilhelm Manual	U. of Minn., M.B. 1939	Dawson, Minn.
Kapernick, John Stuart	U. of Ill., M.D. 1937	Mayo Clinic, Rochester, Minn.
King, Harry Edward	Western Reserve, M.D. 1936	Mayo Clinic, Rochester, Minn.
Knights, John A., Jr.	Geo. Washington U., M.D. 1936	1775 Van Dyke Ave., Detroit, Mich.
Knutson, George Olaf	Northwestern, M.B. 1937, M.D. 1938	213 Main St., Negaunee, Mich.
Kohlmeyer, Frederick Charles	U. of Minn., M.B. 1939	327 N. Galbraith St., Blue Earth, Minn.
Kyser, Franklin Arthur	Northwestern, M.D. 1938	Mayo Clinic, Rochester, Minn.
Lambert, Lois Ruth	U. of Minn., M.B. 1938	St. Mary's Hospital, Minneapolis, Minn.
Lambertus, Paul Theodore	Rush Med. Col., M.D. 1935	Mayo Clinic, Rochester, Minn.
Larrabee, Walter Freemon, Jr.	U. of Minn., M.B. 1939	Chippewa Falls, Wis.
Larson, Evrel Arthur	U. of Minn., M.B. 1938	Ancker Hospital, St. Paul, Minn.
Licht, Hersh	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Little, Edgar Hugh	Washington U., M.D. 1937	Mayo Clinic, Rochester, Minn.
Llewellyn, Maxwell Bowler	U. of Minn., M.B. 1939	1599 Stanford Ave., St. Paul, Minn.
Locke, William	U. of Manitoba, M.D. 1938	Mayo Clinic, Rochester, Minn.
Maino, Charles Runston	Stanford U., M.D. 1938	Mayo Clinic, Rochester, Minn.
Mason, Bernard Augustine	McGill U., M.D. 1937	Mayo Clinic, Rochester, Minn.
McCall, Cooper Holtzclaw	Johns Hopkins U., M.D. 1936	Mayo Clinic, Rochester, Minn.
McCannel, Donald Archibald	Rush Med. Col. M.D. 1937	Mayo Clinic, Rochester, Minn.
McCloud, Charles Naumann, Jr.	U. of Minn., M.B. 1939	Ancker Hospital, St. Paul, Minn.
McGee, Horace Duane	Rush Med. Col., M.D. 1938	Ancker Hospital, St. Paul, Minn.
McLoughlin, Christopher John	Hahnemann Med. Col., Phila., M.D. 1937	Mayo Clinic, Rochester, Minn.
Meyer, Wallace Martin	U. of Minn., M.B. 1939	925—1st St., Rochester, Minn.
Miller, Harold Edmund	U. of Minn., M.D. 1937	Mpls. General Hospital, Minneapolis, Minn.
Miller, Harry Allen	U. of Minn., M.B. 1939	134 Homewood Drive, Fairmont, Minn.
Moir, William Wilmerding, Jr.	U. of Minn., M.B. 1938, M.D. 1939	3007 Nicollet Ave., Minneapolis, Minn.
Murray, Robert Alexander	U. of Minn., M.B. 1939	Eitel Hospital, Minneapolis, Minn.
Naegeli, Frank De Lee	U. of Minn., M.B. 1936, M.D. 1937	317 Union St. S. E., Minneapolis, Minn.
Nickel, Walter Russell	U. of Minn., M.B. 1937, M.D. 1938	Mayo Clinic, Rochester, Minn.
O'Donnell, Joseph Edmond	Northwestern, M.B. 1933, M.D. 1934	Mayo Clinic, Rochester, Minn.
Ostergren, Eva-Jane	U. of Minn., M.B. 1938	963 Payne Ave., St. Paul, Minn.
Perry, Thornton Tayloe III	U. of Virginia, M.D. 1937	Mayo Clinic, Rochester, Minn.
Peterson, Osler Luther	U. of Minn., M.B. 1938	University Hospital, Minneapolis, Minn.
Plimpton, Nathan Cope, Jr.	Rush Med. Col., M.D. 1937	Mayo Clinic, Rochester, Minn.
Reader, Donald Richard	U. of Minn., M.B. 1938	St. Mary's Hospital, Minneapolis, Minn.
Richardson, Ralph Dennett	Harvard, M.D. 1935	Mayo Clinic, Rochester, Minn.
Robb, Charles Stuart	U. of Minn., M.B. 1939	2416 Roslyn Ave., Duluth, Minn.
Rogers, Robert Gifford	U. of Minn., M.B. 1939	717—6th St. S. E., Minneapolis, Minn.
Roth, George Clark	Northwestern, M.B. 1937, M.D. 1938	Ancker Hospital, St. Paul, Minn.
Sax, Milton Herbert	Rush Med. Col., M.D. 1937	316½ Grant Ave., Eveleth, Minn.
Schroeckenstein, Hugo Franz	U. of Minn., M.B. 1938	Miller Hospital, St. Paul, Minn.
Smith, Larry Allen	Northwestern, M.B. 1938	Ancker Hospital, St. Paul, Minn.
Sorem, Milton B.	U. of Minn., M.B. 1938	Miller Hospital, St. Paul, Minn.
Sullivan, Arthur William	U. of Ore., M.D. 1938	Ancker Hospital, St. Paul, Minn.

(Continued on page 326)



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LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON MAY 11, 1939

(Continued from page 324)

BY EXAMINATION

Name	School	Address
Sutton, Edmund Benedict	U. of Vermont, M.D. 1937	Mayo Clinic, Rochester, Minn.
Tischer, E. Paul	Indiana Univ., M.D. 1937	Mayo Clinic, Rochester, Minn.
Twyman, Richard Allen	Northwestern U., M.B. 1937, M.D. 1938	Mayo Clinic, Rochester, Minn.
Vanderhoof, Edward Spaulding	U. of Minn., M.B. 1939	Abbott Hospital, Minneapolis, Minn.
Vinje, Edmund Gordon	Northwestern, M.B. 1938	Ancker Hospital, St. Paul, Minn.
Walsh, William Thomas	U. of Minn., M.B. 1938	St. Barnabas Hospital, Minneapolis, Minn.
Wiig, Laurence Maxon	U. of Pa., M.D. 1933	Mayo Clinic, Rochester, Minn.
Wold, Lester Eugene	Rush Med. Col. M.D. 1938	Ancker Hospital, St. Paul, Minn.
Youel, Milo Ashbel	U. of Minn., M.B. 1939	Lake Park, Minn.

BY RECIPROCITY

Cunningham, Charles Barnard	U. of Mich., M.D. 1934	401—1st St. S., Virginia, Minn.
Kibler, John Martin	Johns Hopkins U., M.D. 1935	Mayo Clinic, Rochester, Minn.
Skarshaug, Harvey James	U. of Iowa, M.D. 1926	Spring Valley, Minn.
Sorum, Frithjof Thorvald	Rush Med. Col., M.D. 1934	Jasper, Minn.

NATIONAL BOARD CREDENTIALS

Barrett, Richard Henry	U. of Vermont, M.D. 1937	Mayo Clinic, Rochester, Minn.
Pennington, Robert Edward	U. of Pa., M.D. 1936	Mayo Clinic, Rochester, Minn.

Minnesota State Board of Medical Examiners

Julian F. DuBois, M.D., Secretary
St. Paul, Minnesota

DOCKET OF CASES

Osseo Farm Woman Sentenced to 4 Year Prison Term STATE OF MINNESOTA vs. ANNA POWERS

On June 9, 1939, Anna Powers, 49 years of age, was sentenced to a term of not to exceed four years at hard labor in the Women's Reformatory at Shakopee, Minnesota, for the crime of abortion. Mrs. Powers entered a plea of guilty on June 1, 1939, after a jury had been selected to try her on a charge of manslaughter in the first degree, following the death, on April 2, 1939, of an 18 year old northeast Minneapolis girl at the farm home of the defendant near Osseo, Minnesota.

The investigation conducted by the Minnesota State Board of Medical Examiners, in cooperation with the sheriff's office and the county attorney's office of Hennepin County, disclosed a number of women, who, upon being questioned, stated that criminal abortions had been performed upon them by the defendant. Shortly after the arrest of the defendant, the young man who stated that he paid Mrs. Powers \$75.00 for the abortion in the case that resulted in the prosecution of Mrs. Powers, was found on a road in rural Ramsey county, with a bullet wound in his chest, which had been self-inflicted. The young man, however, made a remarkable recovery and the defendant, upon seeing the number of witnesses for the state on the date the trial opened, changed her mind and plead guilty.

Mr. Herbert T. Park of Minneapolis, one of the attorneys for the defendant, made a rather lengthy plea to the Court in which he asked that the sentence be suspended and the defendant placed on probation in his care. Mr. Park's plea was immediately denied by Judge Baldwin, who pointed out that the state had shown the defendant a great deal of consideration by permitting her to plead guilty to abortion rather than manslaughter. Judge Baldwin also pointed out that the state had available, in the event of trial, a number of witnesses who would testify to other abortions.

The Minnesota State Board of Medical Examiners is very grateful for the cooperation shown by Inspector Andrew Crummy of the county attorney's office, and the splendid handling of the case by Mr. Arthur Markve and Mr. Per Larson, assistant county attorneys. Fine cooperation was also received from Doctors Gilbert Seashore and C. A. Hobbs, Coroner, and Deputy Coroner, respectively, of Hennepin county.

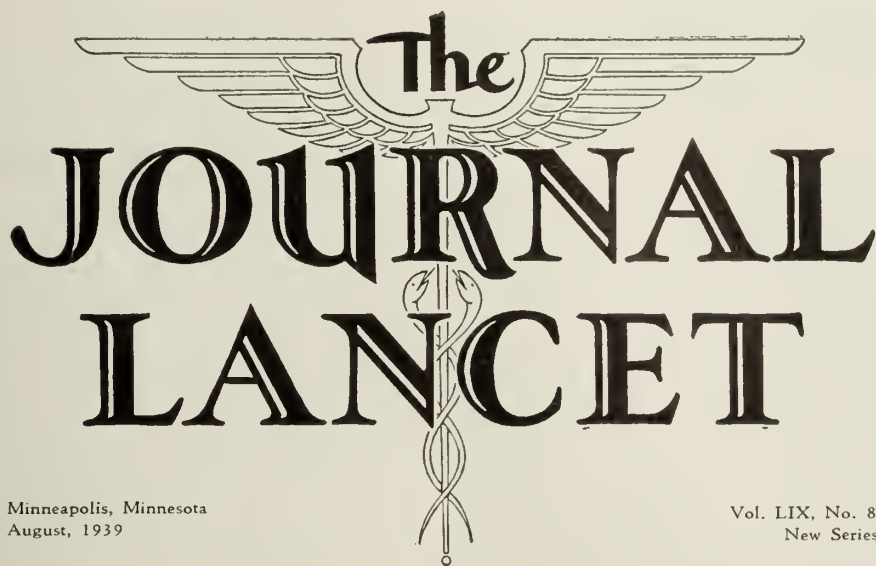
St. Paul Man Pleads Guilty to Illegal Sale of Medicine

Re: STATE OF MINNESOTA vs. WILLIAM MCCOY

On April 25, 1939, William McCoy, 34 years of age, entered a plea of guilty in the Municipal Court of St. Paul to a complaint charging him with dispensing, vending and selling, at retail, drugs and medicines without being a licensed pharmacist. McCoy was sentenced to pay a fine of \$50.00 or to serve 10 days in the St. Paul Workhouse. He paid the fine.

McCoy was arrested on February 9, 1939, following a joint investigation made by the St. Paul Police Department and the Minnesota State Board of Medical Examiners. The investigation resulted from complaint that young girls and married women were purchasing medicine from the National Health Service Bureau at 1591-1593 University Ave., St. Paul, for delayed menstruation. When questioned at police headquarters, McCoy stated that he was the owner of the National Health Service Bureau and that he had operated it for a little over a year. He also signed a statement admitting that since he had been operating the National Health Service Bureau, he had performed between 20 and 25 abortions for an average fee of \$40 per case. McCoy also stated that he was unmarried and lived at 594 Ashland Ave., St. Paul, and that he had resided in St. Paul all his life. McCoy is not licensed to practice any form of healing in the State of Minnesota, nor is he a registered pharmacist.

Neither the Minnesota State Board of Medical Examiners, nor its attorney, were consulted about the final disposition of this case in Court and the Medical Board does not approve of the disposition made. McCoy, at the time of his arrest, was charged with a gross misdemeanor, to-wit: in that he did "wrongfully, unlawfully and wilfully have in his possession, with intent to sell, a drug for causing unlawful abortions." Such an offense is punishable, under the laws of Minnesota, by a fine of not to exceed \$500.00, or not more than one year in jail, or both. The Medical Board feels that this is the least that the defendant should have been charged with.



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Fifty-Second Annual Session

Fargo, North Dakota

May 8, 9, 10, 1939

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 A. W. SKELSEY, M.D., *Secretary of the Association* Fargo

***Deceased.

PROCEEDINGS
 of the
HOUSE OF DELEGATES
 of the
FIFTY-SECOND ANNUAL MEETING
 of the
NORTH DAKOTA STATE MEDICAL
ASSOCIATION
Fargo, North Dakota
Monday, May 8, 1939

The first session of the House of Delegates was called to order by the President, Dr. W. H. Long, at 10:05 A. M., Monday, May 8, 1939, in the Reading Room of the Hotel Gardner, Fargo, North Dakota.

At the suggestion of President Long, Secretary Skelsey called the roll, and the following officers, councillors and delegates and alternates responded:

Doctors:

W. H. Long, Fargo
 Albert W. Skelsey, Fargo
 M. MacGregor, Fargo
 G. F. Drew, Devils Lake
 A. R. Sorenson, Minot
 F. L. Wicks, Valley City
 N. O. Ramstad, Bismarck
 F. W. Fergusson, Kulm
 Charles MacLachlan, New Rockford
 A. E. Spear, Dickinson
 H. J. Fortin, Fargo
 Frank I. Darrow, Fargo
 J. B. James, Page
 H. J. Mattson, McVile
 W. A. Liebeler, Grand Forks
 O. T. Benson, Glen Ullin
 R. H. Waldschmidt, Bismarck
 C. C. Smith, Mandan
 A. P. Nachtwey, Dickinson
 L. J. Seibel, Harvey
 W. K. Cuthbert, Hillsboro
 H. B. Huntley, Kindred
 P. H. Woutat, Grand Forks
 W. A. Wright, Williston
 A. F. Hammargren, Harvey
 A. M. Thompson
 A. W. Macdonald, Valley City.

The President declared a quorum present and the House duly constituted for the transaction of business.

Upon motion, duly carried, the Secretary was instructed to send flowers and message of condolence to Dr. George M. Williamson, Councillor of the Third District, and Secretary of the North Dakota State Board of Medical Examiners, then confined to an hospital.

On Motion, duly seconded, and carried, the Transactions of the annual meeting, May, 1938, as contained in the *JOURNAL-LANCET* for August, 1938, were accepted.

Secretary Skelsey read the following report:

The Annual Report of the Secretary

Mr. President and members. For the calendar year 1938 we had a paid membership of three hundred and ninety (390). This year, up to May 8th, we have already a membership of three hundred and eighty-seven (387). Detailed statement of receipts is attached to this Report.

The American Medical Association, its opponents, lay and medical: Despite vicious bombardments against our national organization, its membership is now the highest on record,—112,210. For centuries past the physicians have enjoyed the humor and the satirical slurs directed against them, in prose, poetry and off the stage; but it is hardly conceivable that in any period has there been such a terrific barrage as now. The American Medical Association and its officers are lambasted from all sides. They have been called a dictatorship, vindictive, and as bitterly opposing allegedly necessary health measures, local and national. Even Washington, D. C., has played politics, and through its Assistant Attorney-General Arnold has

filed suit against that organization, alleging a Trust, hence violating the Federal law against monopolies. Demurrer thereto has been filed by the American Medical Association, yet it will be put to some decided and unnecessary expense in contesting this suit. (By this time you may have noticed that the subscription price of the *Journal* has been increased to \$8.00.)

Health Propaganda from Governmental and Lay Agencies: A massed meeting of the bulky Interdepartmental Committee, instituted some time ago by President Roosevelt, was held in Washington, D. C., last summer. According to our official headquarters, the medical profession was not given much say, in the way of preparation of the lengthy programme, nor very much consideration at the meetings themselves. Among the fantastic plans then brought into the daylight were those contemplating for nation-wide medical service, an annual appropriation of Eight Hundred and Fifty Million Dollars (\$850,000,000) for a consecutive period of ten years, or a total of Eight Billion, Five Hundred Million Dollars,—presumably to be handled and maltreated through political agencies. Opposing such plans and excessive outlays until proved necessary and placed under proper control, the American Medical Association had a special meeting of our national House of Delegates, in Chicago, last September, and there discussed the various features involved; appointed a committee authorized to confer with President Roosevelt, and to request that an equally numbered committee be in turn selected by him to represent the Federal government and those others tied up with the various propositions; all for joint conferences. This year U. S. Senator Wagner introduced a Bill into Congress, which is stated to be very much more conservative than that proposed at large by the interdepartmental bodies. Final action not yet reached. In what is intended, apparently, to be seriously considered is a proposition that there shall be entitled to nation-wide medical care, all persons receiving \$3,000.00 annually and below that sum. This might effect and also affect at least about eighty per cent (80 per cent) of the whole population in these United but bewildered States.

In connection with the onslaught against the medical profession, and the seeming attempt of the federal and the state governments to place the profession on hot coals, and attempted regimentation, we call attention to the countercharge against this, by quoting the following extract from Democratic National Congressman Samuel B. Pettengill in his book, *Jefferson, the Forgotten Man*, published by America's Future, Inc., 205 East 42nd St., New York: (Chap. 8, Exhibit A., Washington, D. C.)

"Before proceeding to obliterate the states, counties, cities, and towns; before wiping out the last trace of local responsibility of cities and of citizens, and turning over to the Great White Father at Washington, the welfare of one hundred and thirty millions of people, let us see how Washington, D. C., is run. Let us take a look at the demigods of Federalism behind the scenes.

As Exhibit A of the blessings of centralized government, all-wise and all-powerful, in which our people have such a child-like faith, Washington, D. C., is an excellent case study. . . . Having said this, let us take a closer look at Washington, the capital of the nation, the baby of Uncle Sam. Let us go through this experimental station of Federal government. Let's see how Uncle Sam has raised his own baby. It will be our worth while before we turn our babies over to his tender care; before we abandon state rights to his protection. . . . Every community is first of all interested in its own health. . . . How about Washington and the health of the people who live in our Federal city?

For the year 1936 per 100,000 population, the vital statistics of Washington and the nation show that the death rate in the District of Columbia was twenty-six (26) per cent higher from cancer than the same death rate in the whole United States:

27 per cent higher from heart disease;
 49 per cent higher and going up, from pneumonia;
 92 per cent higher from tuberculosis;
 106 per cent higher from alcoholism;
 119 per cent higher from syphilis.

So, on this vital question of health, put down the home of

the federal government on one side, and on the other side the average of health conditions throughout the rest of the nation. Then ask yourself, whether the federal government is doing such a good job in comparison with what is being done in your home town, as to lead you to want it (national government) to take complete responsibility for the health of your children.

For every one thousand live births in the District of Columbia, the infant mortality is twenty-six (26) per cent higher than that of the whole United States, and the maternal death is ninety-one (91) per cent higher. Perhaps I should again remind you that I am giving figures about Washington, D. C., not one of the abandoned coal towns of West Virginia or a mill town in the South. These are the figures of the model city of a benevolent paternalism."

Unfortunately, in their efforts to fall into complete line with some of the Washington dictates and statements as to the inferiority of the medical profession, it appears that in certain states some of the local medical societies are soliciting and pressing for financial grants from the national-state governments for conditions and projects which are entirely within the bounds and the scope of the profession itself. For instance, here we call attention to a communication just received. It seems there has been developed, among some of the profession, a national so-called Postgraduate-Work Association, which apparently aims to guide the erring, neglectful, and under-educated member of the medical societies, in that he may not be too decided a burden to the community and to himself, as well as a disgrace to the profession,—even though a product of our best universities. There is of course, and very decidedly, no question about the necessity of our fraternity keeping themselves well posted in their professional work, whether as a general practitioner or as one of those who have gone into the many-sided specialties. But the interesting part of the communication above referred to is that along with its invitation that our delegate to the national American Medical Association St. Louis convention, May 15 to 19, 1939, participate in a luncheon with the postgraduate body, there is included notice of the following proposition to be discussed and settled:

"Q. 4: Should the government or organized medicine, either or both, at some future date require some form of postgraduate study for the renewal of license to practice medicine?"

Is there any doubt how our own House of Delegates would instruct our national delegate to answer this inquiry from an outside organization, entirely distinct from the national organization, the American Medical Association?

Medical Economics and the State: As the subject of our Understanding with the federal-state authorities looking to emergency medical care of those families in the drought areas, we write the following into our records: Some of the local societies have expressed through the State President or the State Secretary their dissatisfaction with the workings of the plan; their main objections being the *pro rata* feature, which has reduced the payment to the physicians to a very low level; and secondly, to the fact that such physicians have been unduly loaded with card-bearing clients. Under instructions from President Long, based also on request from the Committee on Medical Economics, we sent circular letters, and included four propositions which we requested the societies to study, and to instruct their delegates accordingly, for the state meeting. So recently as May 5th, 1939, the Committee on Medical Economics and Drs. Long and Skelsey met in Bismarck, representatives of the government, and discussions were had, in an endeavor to decide whether or not the whole plan of the Understanding should be abandoned, or whether some different form of medical care and proper payment therefor, be developed.

Regional Director, Mr. Ward; State Director, Mr. Maddock; Dr. Williams, the governmental representative from Washington, D. C., entered into the discussions, and it was admitted by them that due to the fairly short time allowed prior to the development of these plans, very probably too much high pressure had been exerted, in order to get the farmers to sign up and to get proper knowledge of what such clients were to be allowed medical care under the proposed agreement. Promise is now made by them that they have been starting a pruning-

out process, in the belief that (1) the clients will be much better instructed; and (2) that possibly there will be many less allowed cards.

In an earnest effort to improve medical economic conditions, several of the state associations, as well as such organizations as the Ontario Medical Society, are developing plans which they hope will be practical. Some of these are described in the *Journal of the American Medical Association*, the plan generally being designated by the name of the state participating. However, it seems very clear that from out of all this turmoil, as well as the defamation generally of the profession, at least the younger generation have come to the conclusion, now and henceforth, under these changed conditions, the local authorities must be responsible for the totally indigent.

Radio Propaganda by Local Medical Societies. This subject is considered in the annual report of that committee. It may not be amiss to call attention to the topic of publicity, and to raise the question whether such propaganda is worthwhile. There are three types of physicians viewing this subject from different angles: One desires to go along in the former, dignified manner; permitting the profession through its daily work, to show its merit and value. Another type believes that a reasonable amount of publicity would greatly aid the profession. The third type wants high pressure methods; the spending of much money, to show the world at large our fervent desire to help it. On the other hand, many of this dear public doubt our actual zeal for the cause of humanity, look askance, and apparently more than ever turn their steps towards the outfit you are decrying. Some societies issue, at intervals, a very large special edition of their city newspaper, devoted almost entirely to the medical profession. One of the larger state organizations issues weekly advance sheets intended for republication by many of the newspapers in their state. Yet we can well believe that the average newspaper and magazine publisher, really dislikes that sort of material; probably pigeon-holes much of it; or permits the yawning wastepaper basket to get its victim.

A few years ago we created a Committee on Public Relations, but soon thereafter in zeal to reduce the number of our state committees, that one went into the discard,—whereas perhaps it would be of better use than some other committees. As the Chairman of the former Committee on Public Relations is one of the delegates to this meeting, the House might desire to get his opinion now.

Our State Medical School. A few days ago that school was inspected by representatives from the Bureau of Education and Medical Colleges, but the Bureau's decision has not yet been made public. The Secretary and his associate stopped off in Fargo, meeting President Long and some other physicians. These Bureau people are anxious to get some accurate information as to how the public itself here feels in regard to the continuance of the School. In Fargo, Secretary Cutter likened the disciplining of the School by his Bureau unto that by which the father disciplines his children,—all for the good. He states that naturally the main object in view, from the standpoint of the Bureau, is to attract public attention to the affair, in an endeavor that the state authorities and the legislature will come to the rescue of the school if they desire it to exist.

The Venereal Diseases Crusade. Uncle Sam and the ladies aiding keep in the headlines to a very decided extent. But there should, it seems, be some home cleansing in governmental circles, as evidenced by the last report on the Health of the Army, which shows that gonorrhoea headed the list of causes for loss of time, as it has every year since the World War,—accounts now for 194,973 days lost. Venereal diseases are costing the Army more than a million and a half dollars for treatment annually, and are responsible for eighteen (18) per cent of the non-effectiveness due to diseases. It is generally understood that the army and navy authorities warn the men against venereal infections, recommend and also furnish prophylactics, and discipline the fellows singled through toying with Venus.—(J. A. M. A., Apr. 1, 1939.)

The North Dakota Legislature of 1939 has gone into the hinterland. So far as the medical field is concerned, two events were proved:

- (1) The medical profession didn't fare very well, despite the frequently repeated wail from the public

that it desired to be protected by that profession from quackery;

(2) The evidence produced, especially in the Senate, showed conclusively the evils of the pernicious system of politically-controlled and regulated state institutions.

The Nation-Wide Medical Survey Requested by the American Medical Association: This was referred to in the State Secretary's annual report of last May. Material for the work was sent in some cases directly by the American Medical Association to the local societies. Also, some forms and several follow-up letters were mailed by the State Secretary to those societies. A few of the district men wrote quite frankly that they did not believe the work involved would justify the result. From some other districts, no reply.

Will the House of Delegates now decide that the subject may be given quiet burial?

Respectfully submitted,
ALBERT W. SKELSEY, M.D.,
Secretary.

State Secretary's report received and referred to the Reference Committee for consideration.

Dr. N. O. Ramstad, President of the Council: Stated that after the meeting of the Council, its report would be delivered to the House of Delegates.

REPORTS OF COUNCILLORS

First District

Dr. M. MacGregor, of Fargo, Councillor for the First District, presented his annual report as follows:

Since the last state meeting the Cass County Medical Society has held seven meetings from October 28, 1938, to April 24, 1939.

Regular, full membership	69
Associate membership	8

Three new members were added during the year, and five associate members were added. Two members were transferred to other societies. A resolution regulating elections of new members to the society was adopted at the November, 1938, session, to the effect that all persons elected to membership in the Cass County Medical Society will be considered as probationary members for a period of one year, during which time they will have no vote. At the end of one year's time their names will be re-balloted upon, and if passed, they will become full members with all the privileges thereof.

An active radio program, through the courtesy of Station WDAY, Fargo, was carried out during the greater part of the year. The Society took an active part in the Public Forum meetings held in Fargo during the winter months. At one meeting Medical subjects were discussed exclusively, the principal topic being Medical Economics in its relationship to the Farmers Mutual Aid Corporation. Most of the Scientific discussions were furnished from our own members.

The Society had the honor of entertaining at the December 22 dinner meeting seven of the newly elected legislators and senators to the North Dakota Legislative Assembly, from our district. Invitations were issued to all twelve of them but only seven were able to attend. At this time Basic Science Legislation was discussed freely by our members in order to present before the Representatives our views regarding such legislation. Keen interest was shown by our guests concerning medical legislation and all of them expressed themselves, some favoring the enactment of a Basic Science Law, some non-committal. All, however, promised to give the subject their earnest study and thoughtful consideration when such proposals came before the legislative assembly during the next session. We are unable to state the results gained by this friendly gesture as expressed in the votes on medical problems by our representatives. It appeared to be a logical way of approaching the problem with the expectation of obtaining the results we desired and we feel justified in recommending to the other societies of the State Association that they follow some such system in the future.

Medical Economic Problems have been the subjects of discussion more or less constantly during the year. The indigent portion of our population continues to be certified to by the Welfare Board for medical care and still receives their medical

care from physicians employed at a salary to furnish such care. The Farmers Mutual Aid Corporation it appears to us has failed, not only the Medical Profession which entered into agreement with it in good faith, but also the public which it was intended to serve and which feels itself so cruelly deceived.

We are pleased to learn that a few of the societies have taken a positive position against renewing further agreements with the Corporation after its expiration on June 30. Some of these societies are located in the very heart of the regions of the state in greatest need of assistance and it is their considered opinion that the system is more detrimental than beneficial to all parties concerned. Cass county has not taken so firm a position but there is a growing sentiment among quite a few of its members that it should do so. However, our delegates have been instructed to take a compromising attitude in presenting this matter before the House of Delegates at this Assembly.

Some discussion has been given at various times during the year to the subject of Maternal and Infant Mortality. Statistics are still described as *appalling*. Refresher courses of postgraduate study have been outlined and carried out for the purpose of improving these statistics. Our Society has cooperated well with these agencies. For many years now we believe there has been a tendency to charge the general practitioner with the high mortality and morbidity rate among mothers and infants. The general profession which constitutes the great bulk of the physicians of the nation has raised little or no defense for themselves against these implications. Is it not about time for them to do so? For instance, in this state the strongest and most active committee is the Committee on Maternal and Child Welfare. The committee is made up of specialists in its own field of practice. It has received and used the support of the State Association, the State Health Department, and has organized refresher courses and has seen its specialty grow to the extent that for several years now practically all of such practice has been in the hands of the so-called specialist. It has even been encouraged and abetted by Federal agencies and Federal grants, first through the Shepard Towner act, and later through Federal general health conferences at Washington, and even through Social Security aid; and yet the conditions nationally are described by them as *appalling*. Where then should the real responsibility for such failure lie? Should we admit frankly that the problem is incapable of solution, or should we continue to subscribe to the blatant optimism of paternalism and lead our people to believe that all their problems will be solved for them by the specialist, and still carry the responsibility of failure on our own shoulders?

Respectfully submitted,
MURDOCK MACGREGOR, M.D.,
Councillor, Cass County Medical Society.

Second District

Following is Devils Lake District Medical Society report for the year 1938:

The Devils Lake District Medical Society has held three meetings, all at Devils Lake. Have taken in three new members and lost three by nonpayment and have two applications pending.

Our first meeting was taken up with the consideration of the American Medical Association survey of medical service in our district which we tried to cooperate with as well as possible. At our second meeting we decided to continue this survey and discussed our relations with the F. M. A. and decided to comply as best we could with the present arrangement. Dr. Sedlacek of Ft. Totten gave a very interesting talk on Trachoma, showing before and after pictures of cases treated by sulfanilamide according to Government regulation, which showed remarkable improvement.

At our March meeting we elected officers for the coming year and appointed Dr. Olafson to attend the course in Obstetrics given by the Center for Continuation Study, University of Minnesota, and passed a resolution instructing our delegate to favor discontinuation of the blue card system as now being used, and a copy of this be sent to each local society, requesting a like action by them.

Our meetings have been very interesting and well attended. We have no dissention of any kind, and can cooperate with everything except the Farmers Mutual Aid.

We reported twenty-eight members, the same as the previous year.

Yours fraternally,
G. F. DREW, M.D.,
Secretary, Devils Lake Dist. Med. Soc.

Third District

(No report received, Dr. G. M. Williamson, Councillor, being in an hospital.)

Fourth District

Dr. A. R. Sorenson read the following Councillor's report of the Fourth District:

The Northwest District Medical Society held eight meetings during the year, which were uniformly well attended. Good programs were rendered at each meeting. This was due in great part to an innovation which was adopted early in the year. Our sessions alternate between the two general hospitals of the city, and a committee was appointed from the staff of each hospital, whose duty it was to provide evening's program. That one might not be outdone by the other, each committee was on its toes to provide well-worth entertainment. Medical economics peculiar to our state came in for frequent and lively discussion. The society went on record as disapproving a continuance of the present F. M. A. C. set-up, and recommending that all members cease honoring the blue cards after March 1, 1939. The latter was quite generally adhered to. The delegates to this state meeting were instructed to oppose any new arrangements that could not promise to pay in full on any agreed fee schedule.

Eight new members were admitted to the society. One was lost by death, and one by removal from the district. On the whole, we feel our society is an active one and that membership in it is distinctly worthwhile from both an economic and professional standpoint.

A. R. SORENSON, M.D.,
Councillor.

Fifth District

The Traill-Steel Society has a membership of nine, with all dues paid for the year. None has been lost by death or removal. One man has come to the territory, and has signified his intention of becoming a member.

In addition to the regular meetings of the Society, which have been well attended, six of the nine members attended the "refresher courses" on obstetrics and pediatrics, held at Grand Forks Oct. 20th and 27th, 1938.

The following doctors serve as officers: President, A. A. Kjelland, Hatton; vice-president, C. A. Hjelle, Portland; secretary-treasurer, Syver Vinje, Hillsboro; delegate, W. H. Cuthbert, Hillsboro; alternate delegate, R. C. Little, Mayville.

In the Sheyenne Valley Society, fourteen doctors hold membership, being a gain of one during the year. There have been no losses by removal or death.

One suit of malpractice came to trial against a member during the year, and this resulted in a verdict for the doctor.

Seven meetings have been held—most of these being called for specific purposes; to hear reports of the delegates to the state medical meeting of '38; to consider service to students of the college and High School; to act in a case of illegal practice in the territory; to study legislative matters; the F. M. A. C. set-up, and to prepare a memorandum to the State Secretary regarding the latter; to choose our representative to the course at the U. of Minn. on obstetrics—this being Dr. Will H. Moore, with Dr. Wm. Campbell as alternate.

At one meeting a resolution was prepared in answer to a letter from the Secretary of the County Welfare Board—in which the Board wished to have the medical committee to consist of one man—with appointment by the Board.

Such action was against the wishes of the local society, and the action was withdrawn.

A study was made of the letters from the State Secretary regarding Radio programs, and committee was appointed to report the results of their findings.

Regarding the F. M. A. C. set-up and its continuation—plan number three was chosen as best.

Pursuant to the idea of the Telephone Company the society voted to withdraw the word "doctor" in the listing of names in the directory.

The following doctors hold office:
President, A. W. Macdonald; vice-president, E. A. Pray;
secretary-treasurer, Will H. Moore; delegate, Will H. Moore;
alternate delegate, A. W. Macdonald.

Respectfully submitted,
F. L. WICKS, M.D.,
Councillor.

Dr. Wicks: There's just one thing I'd like to report. Dr. Robert E. Pray of our Society presented the "Program for the Management of the Premature Infant" on May 3rd. This was a dinner meeting and well attended.

Sixth District

Dr. N. O. Ramstad read the following Councillor's report of the Sixth District:

The Sixth District Medical Society had a paid-up membership of sixty-eight on May 1, 1939.

During the last year we lost two members by transfers to other states. There were no deaths among the members. Dr. Willis Shepard transferred to Oregon, and Dr. Ralph Vinje to Minnesota.

New members admitted during the year were Dr. Mark Williams of Linton, who transferred from the Southwestern Medical Society; Dr. R. H. Leavitt of Carson rejoined this society after a few years' absence in California; Dr. Carl Baumgartner, Dr. Alton Grorud and Dr. E. D. Perrin of Bismarck, and Dr. M. S. Jacobson of Elgin were elected to membership during the year.

Five meetings were held with an average attendance of forty. Much credit must be given to many of our members who seldom missed a meeting in spite of residing a long distance from the place of meeting.

We had three guest speakers during the year to whom we are greatly indebted for inspiring addresses: Dr. W. H. Thompson of the University of Minnesota, Dr. M. A. Shillington of Glendive, and Dr. Ralph Pray of Fargo.

A fine spirit has prevailed during the year and much interest has been taken in our medical society meetings.

N. O. RAMSTAD, M.D.,
Councillor, Sixth District.

Bismarck, N. D., May 5, 1939.

Seventh District

DELEGATE: Dr. Arzt is out of the room.
(Dr. Arzt's report—not read at this time, but included here.)

Councillor's Report—Seventh District Medical Society
It is a pleasure to report the activities of the Stutsman County Society during the past year.

November 8th, 1938, the Society planned to give ten minute radio talks on each Tuesday with material to be secured from the American Medical Association. At this meeting Dr. G. A. Dodds gave a very interesting illustrative lecture on "Bronchiectasis."

December 1st, 1938, was a very successful meeting with an exceptional attendance, fourteen members and eighteen guests from five of the adjacent districts. The program was given over to Dr. Brandes who spoke on "State Medical Economics," and Dr. Larson, who spoke on "Medical Legislation." A rather spirited discussion followed these talks, which I believe was of marked benefit to all present.

January 27th, 1939, business preceded the usual program, with election of officers for the ensuing year:

President, R. D. Nierling, M.D.; vice-president, George Holt, M.D.; secretary-treasurer, Bertha Brainard, M.D.; censor, T. L. DePuy, M.D.; delegate, S. W. Melzer, M.D.; alternate, Joe Sorkness, M.D.

The speaker of the evening was Dr. Long who spoke on "Common Cardiac Disorders." This was a very enjoyable program, and much good resulted from the way in which this subject was presented.

February 23rd, 1939, Program: Dr. Ricker of Rochester who spoke on "Headaches and Diagnosis."

March 5th, 1939. We had a special meeting which was taken over entirely with business matters. At this meeting there was a very animated discussion in regard to the attitude of the County Society to the F. M. A. C. After considerable discussion pro and con, it was decided that the Society should

send letters to the component societies of the state, requesting the President of the State Society to call a meeting of the officers and committees necessary, so that this contract or agreement with the F. M. A. C. would be abrogated.

March 23rd, 1939, the question of taking advantage of the Obstetrical Conference to be held at the University of Minnesota the first week was considered, and the name of Dr. Bertha Brainard of Jamestown as delegate and Dr. Owen of New Rockford, alternate, were selected. The program at this meeting was by Dr. Wohl of Minot, who spoke and illustrated various X-ray diagnoses.

April 27th, 1939, a business session with further discussion of the F. M. A. C. Inasmuch as no definite action had been taken up to the present time by the State Society, and the delegate and the alternate were instructed as to the present attitude of the Society with present arrangements and any possible further contact with this organization, the program was given over to Dr. Ralph Pray, who presented an excellent paper on the care of prematures.

To recapitulate, the Society has had a very splendid year, seven meetings with a total attendance of one hundred forty-two, and seven guest speakers. Our meetings are all preceded with a dinner and usually one or more medical films are shown during the evening. During the year there have been twenty-seven ten-minute radio programs, given over the local radio station.

Our society has at present twenty fully paid-up members. One member left the city during the year and will probably join the Cass County group.

I think the Society has been very active and has accomplished much in all lines that pertain to the medical practice, and is in excellent financial condition.

Respectfully submitted,

P. G. ARZT, M.D.

Eighth District

Dr. F. W. Fergusson read the following Councillor's report of the Eighth District:

The Southern District Medical Society held three meetings during the past year with an average attendance of ten members present.

Several films were shown at these meetings followed by discussions.

At present there are twelve members in the district. There are three doctors in the district that are non-members but who are eligible. We have had no new men locate in the district but have lost one member, namely, Dr. C. H. Sherman, who left Oakes to locate in Stillwater, Minn.

F. W. FERGUSSON, M.D.,

Councillor.

Ninth District

Dr. MacLachlan read the following Councillor's report of the Ninth District:

Membership, twelve. Dr. Hammargren resigned, to join the Northwest District Society. Officers during the year 1938:

President, Dr. Westervelt; vice-president, Dr. MacLachlan; secretary-treasurer, Dr. Van de Erve; censors, Dr. Matthaei, two years; Dr. Crawford,** one year; Dr. Seibel, three years.

The Society held five meetings during the year, which may be summarized as follows:

January, 1938, New Rockford. Reconsidered the disbanding of the organization, and instead, decided to carry on. Officers elected as noted above.

April, 1938, Fessenden. Revision of the Constitution considered, as well as the subject of the Christmas Seals. Politics in our educational institutions condemned. Interesting clinical cases presented and discussed.

September, 1938, Fessenden. Blanks as furnished by the American Medical Association Bureau of Medical Economics distributed. The value of this material was held doubtful, as it was felt that the result would be inconclusive.

Guest speaker, Dr. Layne of Minneapolis, who outlined the scheme of postgraduate instruction offered by the University of Minnesota. Referred to the value of the fellowships offered by the Mayo-Minnesota University, covering postgraduate work. The Doctor also spoke on the subject of contagious diseases and of the value of newer methods of diagnosis and treatment of pneumonia.

November, 1938, Carrington. Eight membership doctors; four visiting doctors, and two dentists. The F. M. A. C. set-up was discussed and a committee drafted a resolution voicing the sentiments of the Society as being opposed to the plan as at present formulated. The introduction of a new basic science law was discussed and advocated, the Society adopting resolutions to be submitted to Chairman Larson of Bismarck. Exhibition of two films, one demonstrating therapeutic exercises of the shoulder joint following dislocation, and one on occupational therapy.

December, 1938, New Rockford. A joint meeting of the physicians, some dentists and some of the legislators of that district, to discuss the legislation affecting the medical profession at the next legislature.

Election of officers for 1939: President, Dr. Boyum; vice-president, Dr. Owens; secretary-treasurer, Dr. Van de Erve; censor, Dr. MacLachlan; delegate, Dr. Seibel; alternate delegate, Dr. Matthaei.

April, 1939, New Rockford. Doctors and nurses. Dr. Pray of Fargo discussed the treatment of the premature and the newly-born infant. Also, there was a discussion of a communication from Dr. Skelsey, State Secretary of the Association, concerning the North Dakota Farmers' Mutual Aid Corporation, asking that our Society give our delegate definite instructions on this subject, for the annual meeting in May, 1939. In general the opinion of the Society was as follows:

They were generally agreed that the amount paid was entirely inadequate; the majority of the Society were against the proposition that each component society deal directly with the Federal government. Some members expressed the belief that actually many farmers now covered by this insurance feature are well able to take care of their own bills for medical services and should do so. No definite action, and the matter will have to be settled in the House of Delegates. However, there was apparently a general agreement that some form of governmental aid is necessary at this particular period, and that it is necessary to meet the problem by getting some payments for services rendered many financially distressed farmers; that this might be a much better plan, than under the former system of taking care of that type, where the account was placed on the books, to be collected at some future time. It was deemed essential that we have a better set-up than at present under the current understanding with the authorities. The statement was made that some farmers would also be much better satisfied were the authorities to pay the doctors more for medical care.

**Deceased.

Tenth District

Dr. A. E. Spear read the following Councillor's report of the Tenth District:

Mr. President, Members of the Council and House of Delegates: As Councillor for the Tenth District, I beg to submit the following report:

We have twenty-six members in good standing this year, this being the same number we had last year. There are two doctors in our territory who are not members. Both of these doctors have applied for membership, but one has been placed on probation for a year as is our usual custom with new members, while the other has been refused membership.

We have held five meetings during the past year and attendance has been unusually good, averaging twenty members per meeting out of a membership of twenty-six.

At our last meeting, April 20, 1939, a resolution was unanimously passed to the effect that we do not favor renewal of any agreement for federal control of medical care in North Dakota.

Respectfully submitted,

A. E. SPEAR, M.D.,

Councillor.

The Treasurer's Report read by Dr. W. W. Wood, and referred to the Auditing Committee.

Additional remarks by Dr. Wood: I also want to say that I have been Treasurer of this Association for seventeen years, and if it now pleases the members to appoint someone else, it wouldn't hurt my feelings.

President LONG: You ask the Nominating Committee. (Applause indicated that Dr. Wood would have to continue in office.)

Reference Committee

President Long appointed the Committee:
 Dr. A. D. McCannel, Chairman,
 Dr. A. P. Nachtwey,
 Dr. W. A. Liebeler,
 Dr. R. H. Waldschmidt,
 Dr. Frank I. Darrow,

and announced that if this committee were unable to complete all of the work transferred to them, he would appoint an additional; that the committee would pass on the reports of the standing committees, etc., and whatever resolutions might be brought before them for consideration.

Report of Auditing Committee

We, your Auditing Committee, have examined the annual report of Treasurer Wood, and find it correct.—(Signed): M. MacGregor, M.D., A. R. Sorenson, M.D., A. E. Spear, M.D.

On motion, duly seconded, the Committee's report was accepted.

REPORTS OF STANDING COMMITTEES

1939

The report of the Committee on Public Policy and Legislation was presented by Chairman Dr. W. L. Larson, and accepted.

Secretary Skelsey read the Necrology report.

Necrology Report

In every avenue of human endeavor there comes a time when the workman must lay down his tools; for "the night cometh when no man can work."

As we pause in the midst of our deliberations to pay our tribute of remembrance to those of our fellows who have ceased from their labors it well becometh us to

*"Keep silent for a space;
 So weak our words they falter on the tongue;
 Silence alone befits our memories."*

RUTH M. MAHON, M.D.

Dr. Ruth M. Mahon of the firm of Drs. Campbell, Williamson, Benwell and Mahon, Grand Forks, North Dakota, was born in Langdon, North Dakota, May 21, 1896, and died at Livingston, Montana, Sept. 1, 1938. Dr. Mahon was a graduate of the University of North Dakota and of Rush Medical College, Chicago. She was a splendid type of professional womanhood, holding her fine qualities of mind and heart, as it were, in trust as community assets. Her obituary appeared in the JOURNAL-LANCKET as of October, 1938.

OSCAR C. DIXON, M.D.

Dr. O. C. Dixon of Adams, North Dakota, was graduated from the University of Michigan in 1904, and was admitted to practice in North Dakota by reciprocity with Michigan in 1919. He practiced for a short time at Fairdale and also at Edmore, North Dakota, before establishing a permanent residence at Adams. He died in a Grafton, North Dakota, hospital in July, 1938, aged 71 years. Dr. Dixon ministered to a large area as a country practitioner, and served his constituency faithfully and well.

EDWARD I. DONOVAN

Dr. Donovan was born in Ontario, a graduate of Queen's University, Kingston, Ontario. He was licensed in North Dakota in 1886, and began practice at Neche, North Dakota, and later moved to Langdon, where he remained the rest of his life. He was a pioneer in spirit, and in addition to his large practice engaged in farming on quite an extensive scale. He died in the Good Samaritan Home, Arthur, North Dakota, October 1938, aged 80 years. Funeral services were from Alphonsis Catholic Church. His was a half century of service unselfishly rendered.

J. M. PHILLIPS, M.D.

Dr. Phillips was born in Wisconsin, June 11, 1868, and died at Cando, North Dakota, June 29, 1938. He graduated from Keokuk Medical College, Iowa, in 1891, and was licensed in North Dakota in 1910. He practiced respectively at Black Creek, Wisconsin, Perth, North Dakota, and Bisbee, North

Dakota. Funeral services were conducted in Bisbee Lutheran Church with interment at the same place. He leaves two sons.

MARTIN J. FARDY, M.D.

Dr. M. J. Fardy, a graduate of the University of Washington in 1918 and a licentiate of North Dakota in 1922, died in a Los Angeles hospital, October 27, 1938, aged 45. He practiced at Minot, North Dakota, for a number of years, and while there was honored by his associates by being elected president of the Northwest District Medical Society. He also held the position of chief of staff of St. Joseph's hospital, Minot. He was buried at his old home in Mukwonago, Wisconsin.

FREDERICK V. LYMAN, M.D.

Dr. F. V. Lyman was graduated from the University of Minnesota Medical School in 1903, and was admitted to practice in North Dakota in 1908, from Pembina county. He practiced in Velva, North Dakota, from 1929 until his death, October 29, 1938, aged 59 years. His survivors include Mrs. Lyman, a son and a daughter.

G. J. WARNSHUIS, M.D.

Dr. G. J. Warnshuis was born in Chicago, Illinois, August 6, 1893, and was graduated from Detroit College of Medicine and Surgery in 1916. He located at Marmarth, North Dakota, in 1918, and received his license for North Dakota January 10, 1919. After practicing at Marmarth for several years he moved to Detroit, Michigan, where he established a large practice, and remained until his death in October, 1938.

N. O. DALAGER, M.D.

Dr. N. O. Dalager was born at Austin, Minnesota, and died at Minot, North Dakota, December 27, 1938, aged 60 years. He was graduated from the College of Physicians and Surgeons, Chicago, in 1902. He practiced his profession at Willow City, North Dakota, 1927, 1928, and at Anamoose, North Dakota, 1929 to 1938, inclusive. He was buried in Austin, Minnesota.

CHARLES JOSEPH KING, M.D.

Dr. C. J. King was born November 27, 1879, at Sheldon, Iowa. He was graduated from the University of Iowa and Northwestern University in 1906, and was admitted to North Dakota practice in 1908. He practiced for a time at Dearborn, North Dakota, and later at Columbus, at Wales, and at Langdon, where he died February, 1939, aged 60 years. He leaves a wife and three children. Dr. King was prominent in civic and fraternal organizations and was recognized as a live wire in the communities where he lived and practiced.

JOHN ESLER, M.D.

Dr. J. Esler was born at Blake, Ontario, December 6, 1874, and died at Cereal, Alberta, July 1, 1938. He was graduated from the University of Toronto, Canada, in 1902; was licensed in North Dakota the same year and began practice in Pembina county, where he remained for several years. He then went to western Canada, engaged in farming and again established a medical practice, built a Community Hospital and ministered to a large territory. He was well and favorably known as "The man who never failed in an emergency." The frontier demands the best, and the pioneer hears the call and answers it.

J. HENRY MOELLER, M.D.

Dr. J. H. Moeller was born in Oslo, Norway, September 27, 1865, and died at Maddock, North Dakota, November 23, 1938. He was a graduate of the University of Christiania, receiving the degrees of B.A., M.A. and M.D. from that institution. He was one of four brothers, and they all studied medicine. He came to North Dakota in 1898 and practiced for a year with his brother, Dr. Thor Moeller, of Hillsboro. He then moved to Devils Lake, later to Rugby, and still later to Maddock, where he remained until the time of his death. In addition to being well grounded in his profession he was an appreciative student of music and art. This combination of the practical and cultural favored the formation of a personality that left its trace in the communities he served for so many years. Appreciation of the beautiful is in harmony with the highest ideals of professional life.

ANDREW Y. THOMPSON, M.D.

Dr. A. Y. Thompson was born in Ontario, Canada, and educated in the schools of his native country. He was graduated from Queen's University, Kingston, in 1908. After practicing for some time in Saskatchewan, Canada, he came to North Dakota, received his license in 1914, and settled in

Larimore, where he remained until his death, February 1939, in a Grand Forks hospital. He was for many years physician to Grand Forks County Farm Home at Larimore, and was generally recognized as an efficient guardian of the institution's best interests.

Dr. Thompson was a fine type of the general family physician, capable, honest, honorable, conservative, and every inch a gentleman. With communities served by such as he, "socialized medicine" would go a-begging.

JOHN CRAWFORD, M.D.

Dr. John Crawford, 66, of New Rockford, pioneer North Dakota physician, died May 23, 1938. Dr. Crawford was graduated from the University of Ontario in 1894; in 1896 he moved to Moorhead and a year later started practicing in Esmond, North Dakota, where he remained until moving to New Rockford in 1912. He was a past president of the North Dakota State Medical Association.

JAMES GRASSICK, M.D.

President LONG: May I ask the Assembly to rise a moment in deference to those men who have passed. (Assembly stood to pay its respects.)

Committee on Public Health

After reviewing the activities of the year and the problems which have been presented for consideration, your committee recommends the following:

(1) That a careful consideration be given by the medical association of permissive legislation to improve state and local health service, and legislation to improve our vital statistics laws.

(2) That the State Medical Association appoint a committee to make a thorough study of the hospital situation of the state, with a view to preparing legislation for the improvement of the standards in all hospitals.

(3) That the State Medical Association encourage the transfer of the Crippled Children's Services to official medical control, in preparation to lay administration as at present in North Dakota.

(4) That the attention of the members of the State Medical Association be called to the fact that the rules and regulations for the control of communicable diseases have been revised as of January 3, 1939, by the State Health Advisory Council.

(5) That the physicians of the state continue their efforts in health education by assuming leadership and supervision over all phases of education related to the practice of medicine, by guiding the activities of the Advisory Health Committees in their respective communities, and by keeping abreast of the developments in modern public health trends.

Respectfully submitted,

MAYSIL M. WILLIAMS, M.D.,
Chairman.

President LONG: Editorial Committee of JOURNAL-LANCET. Dr. Arnsen? Is no report available from that committee? (No report was made at this time, as this report was taken up at the Council meeting.)

President LONG: Dr. French's report.

Secretary SKELSEY: Dr. French sent in his report on Medical Education, and states he will be at the meeting later.

Secretary Skelsey read Dr. French's report on Medical Education.

Committee on Medical Education

The members of the Committee on Medical Education have been in frequent contact throughout the year by conference and correspondence.

The plan of the School of Medicine as well as its reasonable success and its difficulties are well known to you.

Because of the lack of clinical facilities the school must perhaps always remain a two year or incomplete school. If it is given adequate support, however, there is no reason why it should not be able to perform a valid service. It limits its admissions in the first year class to about twenty-five; the second year class made up of those that can be promoted usually has a few less. This year the first year class numbers twenty-six, the second year class twenty-one. Its admissions with but very few exceptions are limited to well qualified applicants from the state; the exceptions when they do occur are similarly well

qualified students from western states in which there are no medical schools.

The class that finished its curriculum in June, 1938, numbered twenty-four; two of these remained at the school as assistants, but they took the places of two others of earlier classes who had remained in similar capacities, and who wished to resume their regular medical studies at that time; there were then twenty-four to seek admission with advanced standing elsewhere. All but one, the lowest ranking member of the class, were accepted and have been pursuing their clinical work in other schools this year, including one at Harvard, two at Pennsylvania, five at Rush, and six at Northwestern. Of that class several representing all levels in scholarship elected to write on Part I of the National Board. The results were gratifying.

The appropriation for maintenance of the school made at the last session of the legislature was considerably better than that of two years ago. The school is handicapped for want of room, but the support in sight should permit satisfactory strengthening of faculty, library and equipment. The school was inspected two weeks ago by Dr. W. D. Cutter, Secretary of the Council on Medical Education and Hospitals, and by Dr. H. H. Anderson of his staff. No report has as yet been received; the Council will probably meet at St. Louis at the time of the Association meeting.

H. E. FRENCH, M.D.
W. C. FAWCETT, M.D.
H. D. BENWELL, M.D.
H. J. FORTIN, M.D.

President LONG: Next the Committee on Cancer. Dr. Larson.

Dr. L. W. Larson read the report of the Committee on Cancer.

Committee on Cancer

The activities of your Committee on Cancer have been confined during the past year to two objectives: (1) To follow the policy of former years in which each component society has been urged to devote at least one meeting of the society to a symposium on cancer; (2) To the supervision of the work of the Women's Field Army in North Dakota.

Your committee believes that the House of Delegates and the entire membership of the State Association should be aware of the fact that the Committee on Cancer of the North Dakota State Medical Association acts as the Executive Committee of the North Dakota Women's Field Army. As such, it controls the policies, administration, etc., of the Women's Field Army. For this reason it is logical to conclude that the entire membership of our State Association should wholeheartedly approve the program of the Women's Field Army. However, this has not been universally true, and we believe that it is the duty of every physician in the state to acquaint himself with the objectives of the Women's Field Army, and also lend what assistance he can to the fulfillment of those objectives. This is not a move which savors of State Medicine; and if our members will take the time to acquaint themselves with the organization, they will find that it can only do our profession good, in addition to helping cancer victims.

Respectfully submitted,

L. W. LARSON, M.D.,
Chairman.

Dr. FRANK DARROW: Mr. President, you might be interested. The Cass County Society had this matter brought up to the local chairman of this woman's society and called me up about it. She had already arranged a meeting of people who were interested in hearing something about cancer. So I gave the talk at this meeting, but we brought the question up at the Cass County Society, and these points were brought out: That Cancer Prevention matter is the one disease that the medical profession itself has sponsored. And anything that's done along that line we will get credit for, and it's not like the tuberculosis situation which was sponsored by the laity nor the venereal disease problem which has been sponsored by the United States Public Health Department. The cancer control is sponsored by the doctors and started by the doctors. I think we should cooperate in this thing, so a committee was appointed by the Cass County Society to work in connection with women's

organizations, and it mainly consists in the fact that they will appoint speakers for anything that these women may have. It would be, I think, very much in line if every society would do a similar thing. With Dr. Larson's permission, I would like to add that to the report.

Dr. LARSON: I think I'll accept that as a supplement of the report. I'm glad to hear that your society has taken that action. Unfortunately, there are many men in the state who do not understand what this is all about, and too many of our members make snap decisions on these affairs, and the ladies just can't understand why an organization that's supposed to be controlled by doctors should not have the wholehearted cooperation of all the members of the profession.

Dr. FRANK DARROW: Friends wanted this in this state—the organization was perfected, and the woman who was put in charge of the county had arranged for some meetings, but she found it impossible to obtain any doctor who was willing to speak on the subject of cancer. Now I think that's a deplorable situation. Out in our own country, we appear before twenty different organizations—made up of clubs to the Salvation Army. The ladies' aid society had a meeting devoted to cancer. You'd be surprised the amount of interest these women have shown in the subject of cancer. And it can't do anything but good for the profession. I think the things I brought up will obviate this difficulty—just a question of getting somebody to speak at these meetings. The usual procedure is to ask anybody who is willing to make a talk of this kind. And of course, in our innate modesty—nobody steps up; but if a committee is appointed to have charge of this, and they appoint the speaker, our society is unanimous in saying that nobody would turn down the speaking at any of these meetings at which they were asked to speak, providing it was at all possible for them to do so. And I think where that is left to a committee, and the men are appointed, you will have no trouble in getting speakers; on the other hand, if you leave it to a voluntary proposition, you won't get any speakers.

President LONG: I think it would be best to come from the societies through the committee in the way of a letter, perhaps, to the component societies on the part of the central committee.

Dr. FRANK DARROW: Another thing, in connection with this, I think the smaller the meeting, the better the results. At least, that's been our experience here. You don't find out what they don't know about cancer, until you get them in a small meeting where they're willing to speak up and ask questions. You take a large public gathering, and I don't think they're worth very much; but in a very small meeting, I think they get a lot out of it, and we gradually find out what the public doesn't know about cancer . . . and that's, of course, what we want to tell them.

Committee on Tuberculosis

(No report made at this session.)

President LONG: The next — the Committee on Fractures. Dr. Campbell.

Dr. CAMPBELL: We plan to meet in a group.

(This report, which was read later, is included here.)

Committee on Fractures

Your Committee on Fractures met at the Gardner Hotel, Fargo, and discussed various phases of the fracture problem.

We are of the unanimous opinion that there has been a marked improvement in the treatment of fractures in the last years. Most hospitals of 50 beds or over carry the minimum requirements for the treatment of fractures, including Thomas splints, bandages, beds, and frames, plaster, wire, etc.

A great number of the accidents which we are called upon to treat are from automobile wrecks on the road, and as a rule the injured person is picked up by a passing motorist, who with the very best of intentions, by rough or bad handling of the case, does additional harm to the already damaged structures and thereby makes a bad condition worse; especially is this true with regard to back injuries, dislocations or fracture of the vertebrae. Ignorant handling of a case of fracture of the spine may result in complete paralysis and a hopeless condition.

We feel that it is important to have the lay public fully instructed in the handling of back injury; it is better to leave the patient lie where he is, and await the arrival of an am-

balance, than to be doubled up in the back seat of a passing automobile.

The committee is of the opinion that all injuries where there is any possible suspicion of a bone injury, should be X-rayed; and in the case of a fracture, that re-raying after reduction is advisable to minimize responsibility of the doctor.

Refusal of the patient for an X-ray in a suspicious case of fracture relieves the physician of a good deal of the responsibility of the after-results if a fracture were present.

That the phrase "splint them as they lie," should be further emphasized not only with the doctors, but with the laity who might accidentally come in contact with the accident before the doctor; emphasizing that the patient should not be moved before the doctor arrives, where possible.

The question of when to advise lamenectomy was discussed, and the committee was of the opinion that a patient with progressive paralysis and a positive Quackenstadt was a proper subject for lamenectomy; but that if the paralysis was complete immediately after injury, that it was not indicated.

The method of treatment in fractures of the femur, particularly with respect to the very aged, was discussed. We are of the opinion that the last word regarding treatment in these cases has not been said owing to the fact that cases of aseptic necrosis of the head of the femur have occurred two and three years after mechanical fixation with pins, etc. That the real Whitman treatment gave very excellent results, and in cases of impacted fracture, that even immobilization with sand bags was often times preferable to the use of mechanical appliances.

The use of the Thomas Hip Splint with traction also gave very good results in certain cases.

As regards Colles' fracture, a thorough reduction with checking on the proper angle of the wrist joint was the important point, followed by the use of a posterior mould or a sugar tong splint.

R. D. CAMPBELL, M.D., Chairman,
Grand Forks.

A. L. CAMERON, M.D., Minot.

J. C. FAWCETT, M.D., Devils Lake.

PAUL H. BURTON, M.D., Fargo.

M. W. ROAN, M.D., Bismarck.

W. W. WOOD, M.D., Jamestown.

A. P. NACHTWEY, M.D., Dickinson.

A. F. HAMMARGREN, M.D., Harvey.

H. J. FORTIN, M.D., Fargo.

President LONG: Committee on Medical Economics. Dr. Brandes.

Dr. H. A. Brandes read the report of the committee on economic problems.

Committee on Medical Economics

The Committee on Medical Economics submits the following report on its activities during the past year:

American Medical Association Survey. We regret to report that the work assigned to this Committee by the House of Delegates at the last annual meeting to prepare a report on Medical Care and Supply in our state for the American Medical Association was not carried out because the information which was to have been sent to us by the component societies did not come into our hands. We understand there was no response to the several requests sent out by the Secretary of the State Association to the officers of component organizations for the material which was to have been gathered and forwarded to us for compilation.

Medical Relief Program Under County Welfare Boards. Owing to the financial condition of the state and the various counties, funds are becoming more inadequate to pay the cost of relief. As a result a number of County Welfare Boards, in an effort to pay their medical bills with the limited funds allotted to them by the county and state, have attempted to set up new fee schedules or have undertaken to pro-rate physicians' bills. In many counties we have the situation where Welfare Boards contract for medical service far beyond their ability to pay.

These matters have been brought to the attention of the State Public Welfare Board.

Unless more funds are made available or the demands for relief are materially reduced, we can expect no improvement under the present conditions.

In reference to the changes made in fee schedules by County Welfare Boards, we are informed that the acceptance of our fee schedule by the State Public Welfare Board does not make it mandatory upon the various county boards to adopt our fees for relief work. Under the Act creating the State Public Welfare Board, the local boards have the authority to adopt their own schedule or to substitute a contract program for the family physician plan. It seems to the Committee that under these conditions problems with County Welfare Boards should be handled locally by a committee from the county or district societies. However, if the local committee wishes assistance from the State Committee we stand ready and willing to assist.

Medical Relief Program for F. S. A. Clients. One of the chief objections to the programs for medical care under the F. S. A. during the past three years has been the lack of continuity. With each change there has been a delay of several months before the new plan could be put into operation. This has resulted in confusion in the administration of programs, with considerable loss to the profession.

Our previous agreement with the Farm Security Administration, which was to have expired June 30, 1938, but was extended to October 31, 1938, was unsatisfactory because of the reduction in the payment of our bills. You will recall at the last meeting the House of Delegates passed a resolution which objected to the pro-ration of our bills, and requested additional funds. After a delay of two months we succeeded in obtaining more money, and our bills for September and October were paid in full.

Negotiations for a new program were delayed by the F. S. A. until the latter part of August 1938 and one month later we were requested to consider a renewal of the 1937-38 program. The Committee objected to the continuance of the plan with its prorata clause because of our recent experiences. It was not until the F. S. A. promised to eliminate the two factors which we believed chiefly responsible for the reduction in payment of our bills that we recommended to the Executive Committee renewal of the previous program. The two factors which we thought accounted for pro-rating were: (1) administrative delay in the certification of the clients to the FMAC, and, (2) collection of dues on a monthly and quarterly basis. We believed that the membership dues of \$2.00 per month per family (\$1.01 of this amount for physicians) on a nine months basis would provide sufficient funds, because statistics gathered under the Resettlement Administration (1936 to 1937) and under the F.S.A. (1937 to 1938) disclosed that the cost per family per month for physician's service ranged from 93 cents to \$1.02.

With the depletion of state relief funds last fall, we felt it was imperative to secure federal funds. This factor, more than any other, was responsible for our recommendation to the State Medical Association.

With the renewal of the program on November 1, 1938, the demands for medical care became unreasonable and excessive. The cost of physicians' services rose from .927 cents per family in October to \$1.57 in November; \$2.11 in December; \$2.20 in January, and \$1.46 in February.

We believe the health insurance feature in the present plan is in a large measure responsible for the breakdown in the program. Other factors, such as lowering of the requirements for eligibility to membership in the Corporation; high pressure salesmanship in securing new members; the lack of understanding on the part of the clients as to the type of medical care allowed under the program; and, the change in procedure for authorization for medical service, all contributed to the unsatisfactory operation of the plan.

Early in December we realized the program was not operating satisfactorily and we at once requested the F. S. A. for additional funds and a conference at an early date.

On February 5, 1939, representatives from the State Medical Association, State Dental Association, State Pharmaceutical Association, and State Hospital Association met with F. S. A. officials in Bismarck and out of this conference a resolution was drafted requesting the F. S. A. for supplemental funds and a change in the monthly allotment to cover the additional costs of the increased sick load during the winter and spring months. To date the request for additional funds has not been granted.

Your Committee, failing to get favorable action on the re-

quest of February 5, 1939, asked F. S. A. officials for a second conference and we met with them in Bismarck three days ago (May 5, 1939). After a lengthy discussion, the Committee submitted the following recommendation for a new plan to furnish medical care to emergency grant clients:

A. That the insurance plan be eliminated and the program be placed on a direct relief basis;

B. That allotment of funds from the F. S. A. to the FMAC be on a basis of a minimum of \$36.00 per year per family;

C. That the fee schedule remain the same as in the previous program;

D. And, that we agree to make a sincere effort to correct any irregularities on the part of physicians participating in the program.

The proposal was submitted with the understanding that if acceptable to the F.S.A. it would not be binding until the State Medical Association had approved the action of this Committee.

We do not believe it is possible to obtain the approval of the F. S. A. to any medical relief program unless we agree in advance on a definite amount to be spent for medical service. With this in mind, we would suggest to this body that if it rejects a state-wide program because with a prorating clause, that the State Medical Association allow local or district societies in need of assistance from the Federal Government the privilege of entering into negotiations with the F. S. A. Physicians can expect no assistance from the counties or the state in the care of F. S. A. clients.

It is regrettable that your Committee did not recognize the inherent dangers in the present set-up, which have been partly responsible for the financial losses you have taken during the past year. We are quite sure that had we rejected the renewal of the previous program your losses would have been much greater.

Again we must remind you that because of depleted funds it is out of the question to expect help from county and state relief agencies. Therefore, we must continue our negotiations with the Federal Government if we are to keep our physicians in the smaller communities and our hospital doors open.

Our experiences of the past three years have proven beyond a question of doubt that any health insurance program for relief clients is unworkable and doomed to failure. We believe, too, that the unsatisfactory operation of our present set-up under the F. S. A. has awakened our people, especially the farm population, to the evils of State or Socialized Medicine.

H. A. BRANDES, M.D.

Chairman.

Remarks by Dr. H. A. Brandes, Chairman of the Committee on Medical Economics:

It may be of interest to the members of the House of Delegates to learn that the cost of medical care to the clients of our county welfare boards is approximately eighteen dollars and eighty-one cents (\$18.81) per family per annum. This figure is based on a report issued by the Public Welfare Board for the fiscal year July 1, 1937, to July 1, 1938. This is approximately six dollars less than the amount allotted to us by the Farm Security Administration. There are several reasons for the lower cost under the county welfare boards. There are a small number of counties employing county physicians, and others have modifications of our medical relief fee schedule. Another factor which keeps down the cost of medical care under the public welfare boards is that the client must present himself before the Executive Secretary for authorization for medical treatment.

I want to take this opportunity to thank the members of my committee and the officers of the state medical association for the fine spirit of cooperation given me during the past year, and for the six years I have served as Chairman of the Committee on Medical Economics.

Dr. LARSON: Mr. President, is this open for discussion?

President LONG: No. This will go to the Reference Committee and then come up for discussion later. The next is Dr. Moore's report on Child Welfare.

Dr. John H. Moore read the report of the Committee on Child Welfare.

Committee on Maternal and Child Welfare

Your Committee on Maternal and Child Welfare has been occupied during 1938 with three major objectives. The first of these was a continuation of the Educational Program for the Physicians in North Dakota. A sub-committee consisting of Dr. Ralph E. Pray of Fargo and Dr. J. L. Conrad of Jamestown were given the responsibility for arranging for the post-graduate courses in obstetrics and pediatrics, and they secured as clinicians, Dr. William F. Mengert, Associate Professor of Obstetrics and Gynecology at the University of Iowa, and Dr. W. H. Thompson, Assistant Professor of Pediatrics at the University of Minnesota, to give the courses for 1938. You are familiar with the plan as carried out last year and in the five cities in which these courses were held, total registration was 287. This large representation indicated the interest which North Dakota physicians had in this type of postgraduate education. Following the completion of this course the same sub-committee sent a questionnaire to the physicians enrolled, asking them for further suggestions regarding subsequent courses. The response to the questionnaire was very gratifying and the sub-committee reported that the majority of physicians favored a continuation of this plan another year and that October was overwhelmingly favored as the month in which to hold the courses. At the conclusion of the course the booklet, *Maternal Care*, approved by the American Committee on Maternal, Incorporated, and edited by Dr. F. L. Adair was sent to physicians of the state by the State Department of Health, following the recommendation and endorsement of your Committee.

At its final meeting of the year held in Grand Forks on December 17th, 1938, the entire personnel of the Committee was in attendance and at this time the sub-committee on the Educational Program for Physicians was instructed to enlarge its work for 1939, and Dr. Pray and Dr. Conrad were continued as this sub-committee.

One phase of the Educational Program for Physicians for 1939 has just been completed. I refer to the ten physicians of North Dakota who have been in attendance at the postgraduate course in obstetrics given at the Center for Continuation Study at the University of Minnesota May 1st to 6th, 1939, inclusive. Plans for this educational work were laid at the Grand Forks meeting of the Committee and the Committee requested that Dr. Maysil M. Williams make available funds for this unique type of postgraduate education. This was done. The ten men who were selected to attend this course were selected by the representative district medical societies. The reports which the physicians in attendance at this course bring back to their respective societies will play a large part in determining whether or not this new phase of postgraduate education should be continued.

The second major objective of the Committee for 1938 was an individual analysis of all maternal deaths occurring in North Dakota. The Committee requested the State Department of Health to make this survey for the years 1937 and 1938. At the scientific sessions of the State Association this year, this material* will be presented as part of the scientific program.

The third and final objective of the Committee for 1938 was the launching of a program designed to reduce the incidence of premature and newborn mortality in North Dakota. The Committee has adopted the following program:

- (1) The establishment of recognized methods of management and feeding of the premature infant as standard in all North Dakota hospitals.
- (2) The purchase and distribution of low-cost incubators to North Dakota hospitals and the eventual placement of incubators in other key spots in the State where hospital facilities are widely spaced.
- (3) The adoption of a modern, recognized technic of resuscitation of premature and newborn infants as standard in all North Dakota hospitals.
- (4) The establishment of a standard summary record form, such as that designed by Dr. Russell J. Moe of Duluth, Minnesota, in all North Dakota hospitals so that statistical data can readily be collected for case studies.
- (5) An educational program of Seminars to be conducted by pediatricists selected by the Committee.

(6) Obtain statistical data on the causes of neonatal deaths in North Dakota both in hospitals and in home deliveries.

(7) Publish a preliminary report of this program as information becomes available and additional reports from time to time as conditions warrant.

Dr. Pray is at the present time engaged in completing the series of Seminars referred to in this program.

Through the cooperation of the University of North Dakota, the University's shop facilities were made available to the Committee for the manufacture of low-cost infant incubators, and at the present time sixteen of these low-cost units are now in use in hospitals throughout this State and additional orders are still being received for them. The Committee wishes to express its sincere thanks to the University for its splendid cooperation in making these units available.

Your Committee feels that the objectives outlined have the support of the physicians of North Dakota. We hope to make more effective the all-important patient-private physician relationship, the backbone of medical practice in general and most particularly in the field of obstetrics and pediatrics and to further this end we respectfully request your suggestions and your continued cooperation.

**Maternal Mortality in North Dakota*, John H. Moore, M.D., F.A.C.S., Chairman North Dakota Committee on Maternal and Child Welfare.

Dr. Frank Darrow read the report of the Committee on Venereal Disease.

Committee on Venereal Diseases

Early in the year a meeting was held at Bismarck in collaboration with the State Department of Health. It was decided to make a survey of medical opinion on Venereal Disease. The following questionnaire was submitted to every licensed physician in the State: (* * * * *)

The response was very gratifying, and the analysis of answers is being made by the State Department of Health. One of the results directly traceable to this survey was the passage of a law by the Legislature making it compulsory for all candidates for marriage to have a serological test for syphilis before being granted a marriage license. A copy of this law is attached to this report.

This Spring the State Department of Health submitted a syphilis control plan. This plan was submitted to the various members of the committee, and while there was some minor criticism, it was approved as we had nothing better to offer. The doctors of the State have received a letter describing this plan together with the various forms to be used, which are added as a part of this report.

In brief it provides for a fee of 50c for each patient activity report per week received from the physician. The object of this plan is to make for better reporting and in particular to control the follow-up of cases. The Department of Health has made no formal report as yet that we are aware of to indicate whether or not there has been any improvement in Venereal Disease control; however, we have had some encouraging verbal reports.

Numerous talks to the laity on syphilis have been given throughout the State, both at local gatherings and over the radio. Perhaps the most significant development since this whole nation-wide Venereal Disease campaign has been conducted is the noticeable fact that Venereal Disease can be discussed under the same kind of conditions as any other subject of public interest.

FRANK I. DARROW, M.D., *Chairman*, Fargo.

M. J. FARDEY, M.D., Minot.*
L. W. LARSON, M.D., Bismarck.
H. D. BENWELL, M.D., Grand Forks.
G. W. TOOMY, M.D., Devils Lake.
D. J. HALLIDAY, M.D., Kenmare.
WILL H. MOORE, M.D., Valley City.
M. M. HEFFRON, M.D., Devils Lake.
T. L. DE PUY, M.D., Jamestown.

*Deceased.

President LONG: We will have Dr. Skelsey's report of the Radio Committee.

Committee on Radio

Based on instructions set forth by the House of Delegates at the last annual meeting, your Committee entered into correspondence with those local medical societies having access to radio stations. In substance, we wrote as follows:

- (1) That, upon request, the Committee would furnish them with approved material for radio transmission;
- (2) That such material would preferably be that produced by the American Medical Association's Bureau of Education and Public Health. Such lists to be supplied by the Committee would indicate many varied topics by the Chicago headquarters, for five, ten and fifteen minutes' talk;
- (3) That all material the Committee furnished would be *gratis* to the local societies;
- (4) That no financial expense against the State Medical Association should be incurred by the local societies;
- (5) That in the event any of the societies desired to utilize material prepared by the societies themselves, then such contribution must first have the approval of the Committee before its transmission over the air;
- (6) That no individual name be publicized by the society. That there must be used only the name of the local society and that of the State Medical Association.

This last-quoted ruling has *not* met with total approval; while now some seem to consider from experience that it is quite proper.

Your Committee has requested definite replies as to how the plan has developed, i. e., the response of the public, as far as can be ascertained; the question of suitable hours; how the majority of the members of the societies look upon the plan. Only a few responses received to date (May 4). One large society (Northwest) decided as of date April 27th, 1939, that they would not participate. Another large society (Cass) are favorable, and state they will continue the work until this fall.

Taking it for granted that the delegates will be duly instructed, your Committee would request from the House at these sessions, some decision in this affair of medical publicity *via* the radio.

Respectfully submitted,
 A. W. SKELSEY, M.D., Chairman.
 C. E. STACKHOUSE, M.D.
 W. A. LIEBELER, M.D.

President LONG: It's just 12 o'clock and we still have some committees to report, but I think that rather than get overtired we better adjourn now until 2 o'clock. I'd like to appoint the Nominating Committee at this time: Drs. W. C. Fawcett, J. W. Bowen, O. T. Benson.

(The First Session of the House of Delegates of the North Dakota State Medical Association was adjourned by President Long at 12 noon.)

SECOND MEETING

**of the
 HOUSE OF DELEGATES**

The second session of the House of Delegates was called to order by the President, Dr. W. H. Long, at 2:05 P. M. Monday, May 8, 1939, in the Reading Room of the Hotel Gardner, Fargo, North Dakota.

Secretary Skelsey called the roll, and the following doctors were present:

- Doctors:
- W. H. Long, Fargo
 - A. W. Skelsey, Fargo
 - G. F. Drew, Devils Lake
 - N. O. Ramstad, Bismarck
 - P. G. Arzt, Jamestown
 - F. W. Fergusson, Kulm
 - Charles MacLachlan, New Rockford
 - A. E. Spear, Dickinson
 - H. J. Fortin, Fargo
 - Frank I. Darrow, Fargo
 - J. B. James, Page

- H. J. Mattson, McVille
- W. A. Liebeler, Grand Forks
- O. T. Benson, Glen Ullin
- R. H. Waldschmidt, Bismarck
- C. C. Smith, Mandan
- A. P. Nachtwey, Dickinson
- L. J. Seibel, Harvey
- W. K. Cuthbert, Hillsboro
- H. B. Huntley, Kindred
- A. M. Thompson
- A. W. Macdonald, Valley City.

Dr. H. J. Fortin read the report of the Committee on Crippled Children.

Committee on Crippled Children

At our last state meeting, there was considerable discussion of the Federal Government's program for the care of crippled children. This program requires that orthopedic and corrective work be done by orthopedic surgeons who are members of the American Board of Orthopedics. It also requires that this work be done in hospitals where adequate follow-up treatments can be given by trained physiotherapists who have the necessary physiotherapy equipment.

However, it is felt by many surgeons of the state that much of this work can be done by the general surgeon located in the territory wherein the case arises. This plan would also entail less expense to the government in the transportation of cases and accompanying relatives from more distant points.

This committee met with Miss Theodora Allen, State Director, in Minot, last June. It was proposed that she take up with the Department at Washington the feasibility of permitting some of this work be done by surgeons who are members of the American College of Surgery. This she agreed to do, and did do. The net result was that we were informed that the Department would not relax any of its regulations, and that the work must be carried on as before. It was pointed out that should the Department open up the field, it would not have adequate control over the selection of the operating surgeon, and that proper value might not be received for the money expended.

- A. R. SORENSON, M.D., Chairman.
- H. J. FORTIN, M.D.
- J. C. SWANSON, M.D.
- W. W. WOOD, M.D.
- R. H. WALDSCHMIDT, M.D.

Dr. FORTIN, of Fargo: In the last year, the practice of this department has been to let the general surgeons around the State do more and more of this work which they should do, and with which they have had experience.

Temporary Committee on Constitution and By-Laws

Dr. W. C. Fawcett, Chairman, presented the proposed document in detail, and asked for suggestions. Considerable time was given to consideration of the various sections; but lack of space in these printed Transactions precludes detailed reporting thereof. The President then appointed, at the request of Chairman Fawcett, several additional men to cooperate with the Committee, in discussing the suggestions brought out in this session; such enlarged Committee to report at the next meeting of the House this day.

At the ensuing session, the consideration of the proposed Constitution and By-Laws was debated for some time, after which it was decided: (a) that the Temporary Committee should be continued for the next twelve months; (b) that the Committee would whip into shape the suggestions brought out in this meeting; (c) that the tentative document would be turned over to the State Secretary, in order that (d) he procure copies thereof, for distribution, in due time, to the councillors and to the secretaries of the thirteen local and district medical societies; (e) that said secretaries shall have read to their membership such document; (f) to be prepared for its consideration and probably its adoption at our next annual meeting.

Place of Next Annual Meeting

Dr. A. D. McCANNEL, of Minot: I am very glad to extend an invitation for this Society to meet with us next year in Minot.

President LONG: We have this invitation from Minot. Are there any others? Motion made, seconded, and duly carried.

Dr. P. G. ARZT, of Jamestown: Mr. Chairman, I may be out of order, but I want now to place an invitation for the Association to meet with us at Jamestown in 1942.

RESOLUTIONS

The first to be presented was by Dr. R. H. Waldschmidt of Bismarck.

Dr. WALDSCHMIDT: Mr. President, we have passed this Resolution in the Sixth District Medical Society April 19, 1939:

WHEREAS: The financial demands placed upon the North Dakota State Medical Association are continually increasing, it is the desire of the Sixth District Medical Society to make the following suggestion to the House of Delegates of the North Dakota State Medical Association:

WE RECOMMEND: That the annual dues to the North Dakota State Medical Association be increased from \$5.00 to \$10.00 in order to have sufficient funds to take care of its necessary financial obligations.

There is another resolution which we passed, same date:

WHEREAS: The operation of the F. M. A. C. has been unsatisfactory for so many reasons, it is the desire of the Sixth District Medical Society to make the following suggestions to the State Medical Economics Committee and to the House of Delegates of the State Association in order that they may be advised as to the reactions of the membership of our Society:

(1) We are unalterably opposed to the F. M. A. C. arrangement of remuneration for medical services, both for doctors and hospital services. It is our opinion that no agreement should be made with the F. M. A. C. which allows any proration of the fee payable. It is our desire that the F. M. A. C. must guarantee the basic fees under which the original agreement was made.

(2) It is also our opinion that the recipients of medical service should be referred to their physicians through the Welfare Board after an investigation has been made to determine the eligibility for medical service on a reduced fee basis. In other words, we are opposed to the plan now in existence—the issuing of cards to the families which can be presented to any physician at any time. This attitude is taken because many of the patrons of the F. M. A. C. have abused the privileges which entitle them to emergency medical care. We believe the elimination of the card system will remove one of the abuses which has placed the plan in jeopardy.

(3) We believe that the amount of money which has been set aside for medical care in North Dakota is insufficient. It is our opinion that the suggested \$2.75 a month per family, or \$31.27 on an annual basis, plus \$1.73 per family per year for administration expense is insufficient to care for the emergency care as our recent experience has well shown.

WE RECOMMEND: To the House of Delegates of the Medical Association that some arrangement should be made for the continuance of Federal aid for medical and hospital service in North Dakota, inasmuch as the elimination of Federal aid or of such plan as the F. M. A. C. would be a tragedy and a hardship not only to the population, but also to the profession, particularly those men located in the rural areas which have suffered unduly from crop failures.

There is another resolution which was passed, same date:

WHEREAS: The operation of the Crippled Children's Program has been unsatisfactory to the majority of the physicians and surgeons of the State of North Dakota and unfair to the majority of the approved hospitals throughout the State, it is the desire of the Sixth District Medical Society to make the following suggestions to the House of Delegates of the North Dakota State Medical Association in order that they may be advised as to the reactions of the membership of our Society:

(1) We are opposed to the present method of operation of the Crippled Children's Program because of the unfair distribution of the work in that only a very few surgeons have been permitted to take care of these children.

(2) It is our opinion that the members of the American College of Surgeons, American Board of Surgery, Western Surgical Association, and other boards of special branches of sur-

gery are capable of performing the necessary procedures in the care of these patients.

(3) We also recommend that the Crippled Children's Program be administered by a graduate of a reputable medical school and licensed to practice in the State of North Dakota. We, therefore, recommend that the state service for crippled children be administered by the official state health agency.

R. H. WALDSCHMIDT, M.D.

C. C. SMITH, M.D.

O. T. BENSON, M.D.

Resolution from Traill-Steele Society

Dr. CUTHBERT: At a meeting of the Traill-Steele District Medical Society held on April 25, 1939, the following motion was unanimously adopted:

"RESOLVED: That we favor a change in the agreement with the Farmers Mutual Aid Corporation so that a certain fixed fee (without deductions of any kind) be paid for services rendered, and that this modified agreement be entered into by the State Medical Association, and not by the individual District Societies."

That's the point that we discussed quite freely there, and we were unanimously of the opinion that whatever is worked out should be worked out by the state association and not by the different districts. You recognize the fact that if we start working district against district, organizers will try to beat one district down, and then they use it as a prop to go over to the next district, and chisel there. And from there they can chisel on the others. Last week we had a representative here from outside of the district and outside of the county; now it's a matter for the commissioner of the Welfare Board trying to make a dicker for contract work to do the work in our county, and that didn't set very good with the fellows.

President LONG: Any other new business?

Dr. FRANK DARROW: I have another "amen" to add to this already growing bunch of resolutions on the F. M. A. C. I received the following letter from our Society. "Your committee appointed to bring recommendations for the Cass County Medical Society relative to the F. M. A. C. set-up, which expires June 30th, after due deliberation recommend: That cards be limited to emergency grant clients; that the pro-rating clause be eliminated; that eligibility to cards be attested to the Welfare Board; that the cards, when issued entitle holder to necessary medical services." The above was acted upon at the meeting on April 24th, and it was moved and carried that you, as a delegate to the state meeting, be instructed to follow these instructions when you meet with the House of Delegates on May 8, 9 and 10.

(The following resolution was made by Dr. W. A. Liebeler of Grand Forks at the Third Session of the House of Delegates, but included here.)

Dr. LIEBELER: Realizing the complexity that has been, and is forthcoming, of the various committees of the North Dakota State Medical Association, and taking peculiar note of the time and energy expended by various committees, and that this load has been more than should have been expected of any member of this Society, and especially of the State Secretary who has acted in that capacity far beyond his present remuneration; that a good deal of the responsibility of the chairmen of the various committees can be lessened; that the component societies and the members of the societies can be more adequately informed; that a more business-like program can be administered; and that the entire consensus of the State Medical Association can be more concretely centralized, by a change in the present set-up of the Secretary of the State Medical Association. Be it, therefore, resolved that a full-time Secretary of the State Medical Association be obtained at a sum not to exceed two hundred dollars (\$200.00) per month, and that the selection of a State Secretary to fulfill the responsibilities of that office be obtained by the Councillors of the State Association. (Moved, seconded and carried.)

President LONG: Any other new business? Resolutions? If not, they will soon go to the reference committee.

Dr. WALDSCHMIDT: Mr. President.

President LONG: Dr. Waldschmidt.

Dr. WALDSCHMIDT: Are we still operating under this Constitution?

President LONG: Yes.

Dr. WALDSCHMIDT: Well, then, we'll have to move if we're going to adopt that \$10.00 for the coming year. We'll have to make a motion to amend the By-Laws, Chapter 9, Assessments and Expenditures, Section I, which reads as follows: "The assessment of \$5.00 — instead of \$5.00 there, put \$10.00 — per capita on the membership of the component societies unless otherwise ordered, is hereby made the annual dues of this Association." I understand that this particular motion here has to lay over one day according to the Constitution. It can't be taken up until tomorrow.

President LONG: To the evening session tonight which corresponds to the third meeting.

Dr. WALDSCHMIDT: Well, I'd like to make that a motion that the assessment be changed from \$5.00 to \$10.00 and the other just the same.

President LONG: Recommend it to the Committee. Second? DELEGATE: Second.

President LONG: All in favor.

All: "Aye". (Carried.)

Some suggestions regarding experiences had in the medical care of persons in the drought areas, based on understandings had with the F. M. A. C. and the F. S. A. the past few years, with complications arising therefrom. Space here does not permit of complete reporting, but the gist of the various talks will be given below. Reference to the annual report of the Committee on Medical Economics and to the annual report of the State Secretary supplement this section of the Transactions.

President LONG: * * * * I believe that resolutions coming from some of the local and district medical societies contain one clause impossible at this time, namely: that the prorating clause in our "understanding" with the federal authorities must be eliminated. When one goes to ask funds from any governmental agency, that person or organization must ask for a certain amount, for a definite purpose; that is the way and the only way such governmental appropriation can be secured, if at all. We must judge from our past experience how much we should request, in the hope that the amount solicited will be high enough to avoid prorating. If we use in ten months the total amount allotted, then we will have to work two months without pay, because when once a definite amount has been appropriated, it would be very hard to get additional funds to supplement the original. I am certain we can be sure of the sincerity of the people, of the authorities, who have interceded for us. If we could get the basic assessment placed at \$3.00 monthly, well and good; but I believe that it would be impossible to flatly eliminate the prorating clause.

Dr. FRANK DARROW, of Fargo: Spoke in regard to the problem of surplus funds remaining any one month,—could such funds be used for a possible shortage the next month? Refers to the trouble the physicians have been having in this respect, and which may be expected to continue under renewed contracts, if the prorating feature not eliminated. Believes, however, that the majority of the delegates attending this meeting have come with the firm idea of no prorating whatever.

Dr. CUTHBERT, of Hillsboro: Cited some very striking proofs of the inadequacies of the present system with the federal-state authorities. Complains that much of this insurance feature was "sold" under high pressure methods, at the expense and to the embarrassment of the doctors. Also raised the often asked inquiry as to what constitutes an "emergency?"

Dr. A. D. McCANNELL, of Minot: As a member of the Committee on Medical Economics and from his past experience as member of the State Welfare Board, discussed these problems. In dealing with governmental agencies, all the Medical Association can do is to present its proposition, and to hope for the best. We did not go blindly into this present plan, because we had a former yard stick by which to estimate the possibility of the plan working out satisfactorily; but of late conditions have changed, due probably in part to the high pressure salesmanship of the authorities in selling the cards, and also due partly to the greatly increased demands of the clients. Add to this the prorating feature gives us the complications deplored by both the practitioners and the authorities. As regards the federal authorities coming in and furnishing funds for North Dakota, calls attention to the fact that twenty-three counties in this State cannot levy enough,—let alone col-

lect enough,—to run their ordinary expenses, to say nothing of affording relief. Had it not been for these contributions from the federal government, we probably would have had many less doctors in at least the Western part of the State. Believes that much as we may dislike it, we must realize the fact that we have to depend on outside relief money coming into North Dakota, if we are going to take care of medical needs. Suggests that for the extra heavy loads of certain months, the federal aid be proportioned above that of the lesser months. Lastly, our connections with the authorities should be state-wide; not merely that several local or district medical societies have separate arrangements with the authorities.

Dr. O. T. BENSON, of Glen Ullin: Compliments our Committee on Medical Economics, and considers that such Committee knows the "answer" much better than some of the physicians.

Dr. L. J. SEIBEL, of Harvey: Expresses his pleasure that his Society (Tri-County) left to the state annual meeting the solution of this problem. Tri-County realizes the difficulties encountered by many of the physicians in the State. As recipients of a gift, we cannot make too strong demands.

Dr. HUNTLEY, of Kindred: Discussed the so-called heavy load months; believes that if additional funds could be secured for same, the plan might eliminate the prorating feature.

Dr. G. F. DREW, of Devils Lake: Considers that in these problems we should place the governmental agencies in a more favorable light. We should realize the fact that these people in North Dakota who have nothing, and who are allegedly starving, are not actually the "wards" of Washington, D. C., although it is claimed that they are. We should realize that the United States Government has diverted millions of dollars into this State in the past ten years, so that really North Dakota is a dependency upon the national government. We should appreciate what Washington does for us, and we should do the best we can under these circumstances. The Government makes mistakes, and so do we. If the Government is willing to change its machinery in this matter of cards for clients, we should try to cooperate. As regards that word "emergency", it really doesn't mean so much; and the best thing to do is to get rid of that word. The card patrons should be thoroughly investigated. There always will be poor pay in the practice of medicine, but if we can eliminate the "poor pay" back to where it was about ten years ago, that is about all we can expect.

(Second meeting of the House of Delegates adjourned at 3:18 P. M., May 8, 1939.)

THIRD MEETING HOUSE OF DELEGATES

The third session of the House of Delegates was called to order by the President, Dr. W. H. Long, at 8:20 P. M., Monday, May 8, 1939, in the Reading Room of the Hotel Gardner, Fargo, North Dakota.

At the suggestion of President Long, Secretary Skelsey called the roll, and the following officers, councillors, delegates and alternates responded.

Doctors:

W. H. Long, Fargo
A. W. Skelsey, Fargo
M. MacGregor, Fargo
A. R. Sorenson, Minot
N. O. Ramstad, Bismarck
P. G. Arzt, Jamestown
F. W. Fergusson, Kulm
Charles MacLachlan, New Rockford
A. E. Spear, Dickinson
H. J. Fortin, Fargo
Frank I. Darrow, Fargo
H. J. Mattson, McVilie
W. A. Liebler, Grand Forks
O. T. Benson, Glen Ullin
R. H. Waldschmidt, Bismarck
C. C. Smith, Mandan
G. B. Ribble, LaMoure
A. P. Nachtwey, Dickinson

L. J. Seibel, Harvey
 H. B. Huntley, Kindred
 P. H. Woutat, Grand Forks
 W. A. Wright, Williston
 O. Haraldson, Minot.

The President declared a quorum present and the House duly constituted for the transaction of business.

Dr. WILLIAMS: I would like to be allowed to write a short summary of some of the Public Health Activities as we have had in other years, to be included in your report to the JOURNAL-LANCET as we did last year; is that all right?

Report of the Nominating Committee

Dr. J. M. Bowen of Dickinson, in behalf of the other members of the Committee (Dr. W. C. Fawcett, Chairman, and Dr. O. T. Benson) presented this report, as follows:

The following members of the Association were nominated by the Committee, and, upon motion, duly seconded, were elected to the offices indicated:

President: Dr. H. A. Brandes, Bismarck.
President-elect: Dr. C. J. Glaspel, Grafton.
First Vice-President: Dr. F. W. Fergusson, Kulm.
Second Vice-President: Dr. A. R. Sorenson, Minot.
Secretary: Dr. Albert W. Skelsey, Fargo.
Treasurer: Dr. W. W. Wood, Jamestown.
Delegate to A. M. A., 1940: Dr. A. P. Nachtwey, Dickinson.
Alternate Delegate: Dr. C. E. Stackhouse, Bismarck.

Councillors:

Fourth District: Dr. A. D. McCannel, Minot.
 Fifth District: Dr. F. L. Wicks, Valley City.
 Ninth District: Dr. Charles MacLachlan, New Rockford.

Recommended as members of the North Dakota State Board of Medical Examiners:

Dr. G. M. Williamson, Grand Forks.
 Dr. Paul H. Burton, Fargo.
 Dr. William F. Sihler, Devils Lake.

President LONG: Are there any other nominations to come from the floor?

DELEGATE: I move that the nominations stand as read.

President LONG: You've heard the motion and the second. All in favor?

All: "Aye".

President LONG: Contrary. (No response). Carried. Any other new business?

Dr. W. C. FAWCETT: The election of Dr. Brandes to the Presidency of this Association, leaves open the chairmanship of the Committee on Economics which he held, I think, for six or eight years. Now these offices are all appointed offices, by the President. We wouldn't expect that Dr. Brandes would name himself as Chairman of that Committee; and I believe and I know that a great many men here who have talked it over and feel that Dr. Brandes should continue at the head of that Economics Committee. In the second place, I think that ought to be in Bismarck at the seat of government—though some of us people from the outside don't think everything should go into Bismarck. I know Dr. MacGregor and I are vitally opposed to that, but this is one point where I do think that the head of the Committee on Economics ought to be—it ought to be in Bismarck. And I don't know of anyone in Bismarck that is better qualified to hold that office than Dr. Brandes. So, Mr. President, I move you . . . I don't know how to put it over—that this House of Delegates elect, if we can do so, Dr. Brandes as head of the Committee on Economics for the ensuing year.

DELEGATE: I second the motion.

Dr. FRANK DARROW: I think the only motion necessary is to have the sentiment of this House of Delegates that he appoint himself.

President LONG: This is a parliamentary procedure beyond me. There's a motion before the House and it's been seconded and certainly there will be discussion.

Dr. BRANDES: Mr. President. I appreciate the kind words of Dr. Fawcett, but I think you are making a mistake to keep a fellow on a committee too long—you need new blood for some of these committees, and I've been chairman for six or

seven years now. As I told you this morning, I enjoyed the work, although there were headaches with it at times. However, I'm quite sure that there are a number of men that served on that committee with me that are capable and well able to and well qualified to head that committee, and I'll only be too glad to help them if they call upon me, but I don't think they need much help. I appreciate what Dr. Fawcett said. I really wouldn't re-appoint myself because I don't think it's necessary.

Dr. BENSON: Mr. President. I think we can let that all go by on some of the things that he said. We know he is qualified and he's wanted, but I think it's an added glory if he appointed himself after we pass this resolution.

Dr. W. A. WRIGHT, of Williston: Mr. Chairman, I'd just like to say that as a member of the Economics Committee, I failed to see how our Economics Committee could function without Dr. Brandes. I can't visualize the situation in which we could operate and how we could ever manage to get along without him. I believe that it's absolutely essential he continue as chairman of the Economics Committee, if the Economics Committee is expected to function as it has.

President LONG: Any other discussion? If not, we call for the vote. All in favor say "Aye".

All: "Aye".

President LONG: Contrary.

Dr. BRANDES: No.

President LONG: Dr. Brandes, govern yourself accordingly.

Is there any other new business?

Dr. LIEBELER: Mr. President.

President LONG: Dr. Liebler.

Dr. LIEBELER: I have a resolution.

(Dr. Liebler read at this time the resolution regarding a permanent State Secretary which was included with the other resolutions at the Second Session.)

Dr. LIEBELER: I make this in the form of a motion for adoption.

DELEGATE: Second.

President LONG: Moved and seconded—and open for discussion.

Dr. FRANK DARROW: Just as a start to the discussion, I might ask, did we pass that ruling on \$10.00, instead of \$5.00 annual dues?

President LONG: That's been passed.

Dr. FRANK DARROW: We will be adding on something for which we haven't got the funds to work with. We can't proceed unless that goes through. I think that should be taken into consideration in the discussion of this resolution or that motion.

Dr. LIEBELER: Mr. Chairman.

President LONG: Dr. Liebler.

Dr. LIEBELER: Before we eliminate the salary from any further discussion, maybe some explanation should be offered. We feel that too much responsibility has been exacted from the Chairman of our Economics Committee and our Legislative Committee. They've expended far too much time to expect from absolutely anyone. We feel that a full-time Secretary can be obtained and give more of his time than the State Secretary has been able to give because of the honorarium that comes to him now. That this load on the committees will be greatly lessened in most cases is our belief.

President LONG: Any further discussion of this resolution, which was presented in the form of a motion? It's been seconded. If not, all in favor say "Aye".

All: "Aye".

President LONG: Contrary. (No response). Carried. Now we come next to the raising of the annual dues, apparently. That was considered at the meeting this morning, and Dr. Waldschmidt says that it must come up for a second consideration. Is there any motion to that effect?

DELEGATE: I'll make that a motion—increasing the dues to \$10.00.

President LONG: Any second?

DELEGATE: I second the motion.

President LONG: Any discussion?

DELEGATE: Will that be adequate?

President LONG: It should be for a start.

Dr. WOOD: That's going to hardly leave you very much better off than you were before. You pay \$200.00 a month. That's \$2400.00 a year.

President LONG: The outer limit was set at \$200.00—it wasn't agreed to pay \$200.00.

Dr. WOOD: Well, if you had it at \$200.00 that would be \$2400.00 a year, and your raising your dues would bring in about \$2000—not quite. Around about 390 members. While that would perhaps cover it, yet it seems to me you're going to run things so close that you're again not going to have much money to work for anything else.

President LONG: Any further discussion?

Dr. FRANK DARROW: We ought to talk this over as to what the effect would be on some of the men who have a hard time paying the former dues. We ought to have a little excess for the membership committee to draw from. I think, with most of the men here, there wouldn't be any question about it, but some of the men thought there might be some who might drop out just because of the excess dues.

Dr. WOUTAT: I think the idea is good; from my knowledge of things elsewhere, our dues here are ridiculously low. There is a question in my mind whether they might have to be raised further. Other States dues are considerably above ours, and they carry on similar activities, and they require a full-time secretary. I'm heartily in favor of such a plan. I merely ask that question whether we might not have to raise them further. If it is the opinion, though, that \$10.00 will carry us, why, that will be fine.

Dr. FRANK DARROW: Somebody brought up the question this afternoon that some professional society or organizations had dues or assessments amounting to \$250.00. Why don't we get some of our bills through?

President LONG: Any further discussion? You've heard the motion to raise the dues to \$10.00, and it's been seconded; what's your pleasure? All in favor?

All: "Aye".

President LONG: Contrary. (No response.) Carried. Is there any other new business? If not, we'll proceed to the Reference Committee. Dr. McCannel?

Report of Reference Committee

Dr. A. D. McCANNEL: Your reference committee met immediately after this afternoon's program, and the way to do is to set the costs by the fruits of our labors. We can't bring them just as well as we thought we could; a little misunderstanding about taking down the records, and some little misunderstanding on getting the records to us; however, I think we can wade through them. The first report will be the Secretary's report. We wish to commend the secretary on his diligent and consecutive efforts. Wish to call particular attention to the section on Question 4: Should the Government or Organized Medicine, either or both, at some future date require some form of postgraduate study for renewal licenses to practice medicine?

Your Committee believes that as regards this Section of the report, it would not recommend the adoption of this Section. We wish to continue with the refresher quizzes, and avoid the expensive set-up that is not justified. In regard to the Section on Radio . . . It is the consensus of opinion of your Committee that they continue the Resolutions as adopted last year at the House of Delegates; and recommend that the component societies avail themselves of the service given by the American Medical Association in furnishing radio talks; this service is available to you through your Secretary, Dr. Skelsey. We approve of ethical, medical publicity before lay groups. In regard to the State Medical School, your Committee is in favor of its continuing, and we wish to commend Dean French on the splendid type of school and the fine type of graduate he is producing. We hope for a favorable report from Secretary Cutler of the American Medical Association. . . . Those are the three points in that Fargo report.

President LONG: Any discussion? The report has been moved—

DELEGATE: I second the motion.

President LONG: It's got to be moved first.

DELEGATE: I so move.

President LONG: Moved and seconded and now it's open for discussion. No discussion. I ask for vote. All in favor?

All: "Aye".

President LONG: Contrary. (No response.) Carried.

Dr. A. D. McCANNEL: Presented the Reference Committee's report concerning the report of the Committee on Public Policy and Legislation:

Your Reference Committee desires to commend Dr. L. W. Larson and Committee for their active interest. We feel that this Committee should be continued for the coming year. We wish to approve the suggestions made by the delegates from Fargo.

We submit this portion of our report, and move its adoption. (Motion seconded, and carried.)

President LONG: Any discussion? All in favor?

All: "Aye".

President LONG: Contrary. (No response.) Carried.

Dr. McCANNEL: This is really going too smoothly; I'm afraid we're heading for it later on. Your committee reports on the Committee on Cancer.

The Committee approves of this report in its entirety, and would add this suggestion, that the question of diagnostic centers for the study of cancer be investigated during the ensuing year, and reported in full at our next meeting. It is your Committee's opinion that this will be one of the most important things to be brought up at the next session of the House of Delegates. We further recommend that refresher courses be given on the subject of cancer. (The motion was moved and seconded.)

President LONG: Any discussion on this Cancer question? All in favor say "Aye".

All: "Aye".

President LONG: Contrary. (No response.) Carried.

Dr. FRANK DARROW: On these resolutions . . . it's a little out of order, but with Dr. Nachtwey here, let us enlarge a little—have a discussion about this cancer question. We discussed these things pretty thoroughly up there, and there are a lot of things that we talked about that aren't in the report. It would appear, it is the plan to have this cancer work done by certain centers; which means certain qualifications adopted by the American College of Surgeons, and every case of cancer be submitted to this approved diagnostic group, which group must have a registered pathologist, a specified amount of radium, an X-ray machine of certain capacity; and that such group keep up records of a certain standard. Now another group has come up—one that can come up to this standard is to be appointed as a special cancer diagnostic center, a therapy center—and as you all know there's a great tendency for people to feel that where cancers are handled everything else should be handled. But that's got to be the last word. And it was the consensus of this committee that the members of this society or, at least, of this House of Delegates, be informed thoroughly on the matter; that this Committee go into it in detail, so it can be reported at the next meeting.

President LONG: Any further postmortem discussion. If not, . . . it's been adopted.

Dr. McCANNEL (continuing the Reference Committee's report): Your Committee on the report of the North Dakota Committee for Maternal and Child Welfare for 1938. Your Committee desires to commend the efforts of the chairman and his associates. We desire particularly to commend the committee's effort in gathering statistics and clearing up the North Dakota record on maternal and infant death. We feel that a real contribution has been made by this committee in the distribution of incubators at such a low cost. Your committee desires to commend that portion before moving its adoption.

Dr. M. MacGREGOR, of Fargo: Called attention to that portion of his Councillor's report wherein he deprecated the frequent and stereotyped use of the word *appalling* by lay and medical people in magazines, radios and other modes of conveyance to the public zest for news and even sensationalism, as regards the alleged lack of proper care of mothers, babes, and children by physicians throughout the different states.

Stated he had hoped that some other members of the Association here assembled would have made some comments thereon. As for himself, he was of the decided opinion that much of that propaganda and criticism was both illtimed and often untruthful.

The Reference Committee's report on the report of the Committee on Maternal and Child Welfare was then adopted by the House.

Dr. McCANNEL, of Reference Committee: The Committee on Radio:

The Committee's report on the Committee on Radio having commented on the Secretary's report on Radio, we find nothing further to report. We recommend the adoption of this section of the report. (The motion was made and seconded.)

President LONG: Any discussion about the radio business?

Dr. McCANNEL, for Reference Committee: The Committee's report on the report of the Committee on Venereal Disease. We desire to endorse this entire report; submit this report and move its adoption. (The motion was made and seconded.)

President LONG: No discussions? All in favor say "Aye".

All: "Aye".

President LONG: Contrary. (No response.) Carried.

(President Long called a five-minute recess.)

Dr. McCANNEL: The Reference Committee's report on the resolutions passed by the Sixth District Committee. Your committee had an exhaustive discussion of this resolution, calling in Dr. Fortin of Fargo as representative of the American Orthopedic Society. In order to refresh the delegates and councillors, I will read the resolution as presented. "Section I, a resolution read as follows: We are opposed to the present method of operation in the Crippled Children's program, because the unfair distribution of the work and that only a very few surgeons have been permitted to take care of these children." Inasmuch as the funds available for this work is controlled by the American Orthopedic Board in Washington, and it is their decision that all of this work must be done by members of the American Orthopedic Society, your committee's opinion was to the effect that well qualified surgeons should be used as much as possible in the furtherance of this work. Section II of their resolution read as follows: "It is our opinion that the members of the American College of Surgeons, American Board of Surgeons, Western Surgical Association and other boards of special branches of surgeons are capable of performing the necessary procedures in the care of these patients." Your committee has been informed by Dr. Fortin that the Committee in Washington which has the dispensing of these funds, do not recognize members of these associations, and recognize only members of the Orthopedic Board, as we stated before, for this type of work. But your committee would urge Dr. Fortin and Dr. Swanson, who have charge of this work for this state, to permit well qualified surgeons wherever possible in the state to carry on this work. Section III: "We also recommend that the Crippled Children's program be administered by a graduate of reputable medical schools, and licensed to practice in the state of North Dakota. We, therefore, recommend that the state service for Crippled Children be administered by the official State Health Agency." Your committee feels that every effort of the State Medical Society should be engaged to that end that this may be accomplished, and that this crippled children's program be administered by the State Public Health Agency. Your committee submits this section of its report and moves its adoption. (The motion was made and seconded.)

President LONG: Open for discussion.

DELEGATE: How are you going to do this? How are they going to get in the class work?

President LONG: This same recommendation was contained in the report of the Public Health Committee. Shall I entertain discussion of ways and means?

Dr. McCANNEL, for Reference Committee: I might say that the report comes to us 28 states in the Union are limited to the State Board of Health. We are one of the states that have it under the Public Welfare Board. I don't want to sponsor or start a discussion because I'm on a Public Health

Board, but I know the difficulty they had in getting the standards set up to meet your Social Security Board at Washington, so that we could avail ourselves of this money for North Dakota. But public fees are administered under this other plan, so there is no reason why North Dakota shouldn't try. The objection to this is that the people who are administering the program which came to us are lay people, with the exception of a medical advisor who has not been consulted in many cases. It's better and safer if it's administered by a regular graduate of medicine.

Dr. FRANK DARROW: I believe, Mr. President, that would have to come before the legislature, and this resolution can be referred to the Committee on Legislation, to look up means for obtaining this agency.

President LONG: Is there further discussion. If there's none, we'll call for the vote. All in favor of this resolution as recommended say "Aye".

All: "Aye".

President LONG: Contrary. (No response.) Carried. On with the next.

Dr. McCANNEL, for Reference Committee: Your Committee's report on the report of the Committee on Crippled Children. Your committee refers you to its previous report on resolution by the Sixth District Society. The Committee moves the adoption of this report.

Your committee's report on the resolution of the Sixth District Medical Society relative to raising or increasing the dues to \$10.00. Your committee recommends adoption of this report. (The motion was made and seconded.)

President LONG: All in favor — Is there any discussion? All in favor say "Aye".

All: "Aye".

President LONG: Contrary. (No response.) All right, will you go ahead with the next.

Dr. McCANNEL: Your Reference Committee's report on the report of the Committee on Medical Economics. We are entirely in accord with Section A which states that the insurance plan be eliminated, and the program be placed on a direct relief basis. Section B. An allotment of funds from the F. S. A. to the F. M. A. C. be on a basis of a minimum of \$36.00 per year per family. Your committee feels in view of the evidence submitted to it that this should be changed to \$33.00 a year. Section C. That the fee schedule remain the same as in the previous program. Your committee feels that this is correct. Section D. That we make a sincere effort to correct any irregularities on the part of the physicians participating in the program. Your committee is in hearty accord with this section. Your committee further recommends that this following resolution be adopted: We agree to limit participants in medical care program to active emergency grant families of F. S. A. We understand this to include only the definitely indigent and that standard grant clients be not admitted to this program. A further recommendation: Any program entered into by the North Dakota State Medical Association with the F. S. A. must be on a state-wide program, and *not* by individual units. We further recommend that . . . no direct loans be made to families and feel that this program should be administered by the F. M. A. C. Further resolution: In order to insure the fact that only the needy receive this care, we insist that all clients under this program be certified by the local welfare board for medical care. Further resolution: It is unnecessary for this committee to take any action on the objection of the F. S. A. that professional groups are collecting in addition to money agreed upon in the fee schedule, as it has been the recommendation of this committee that only true indigence be included in this group. These recommendations and resolutions are made in view of the fact that Federal aid is necessary, due to the depletion of state and county funds. Your committee desires to present this section of its report and move its adoption. Your committee has carefully considered the Council's report and we feel that all controversial matters have been covered in the report as submitted. (The motion was made and seconded.)

Here followed many discussions on the subject of medical relief in connection with F. M. A. C. and the F. S. A.

Attention was called to the differences between the standard grant class and the emergency grant class.

One speaker urged full consideration of the whole affair, in order that delegates might carry back to their local societies full data exchanged at this meeting, especially as there has been some adverse criticism on the part of certain members who evidently were not fully informed as to all of the complications embraced in the drawing up of the so-called "understanding" with the federal-state authorities. Then, too, in view of recent experiences in the development of the relief programme, there are some members who are utterly opposed to any alliance with governmental agencies covering this relief work. Some delegates, while protesting against the abuse of the card system, under current plans, also referred to their earlier disagreeable experiences in trying to get from local welfare boards, authorization for emergency work, notably during night time, when it was very difficult to get in touch with local or county officials. By previous correspondence, and as brought forth at this annual session, many physicians felt that in the issuance of the cards, the authorities had not exercised sufficient care in impressing upon the card holders that the medical care was for emergency relief only. Some of the speakers felt that better results would be obtained were the welfare boards allowed to examine critically the merits of each family or person applying for medical care. Vigorous discussions as to the merits of the two systems. Some men felt that there has been too much of a tendency, under the present plan, for card holders to go shopping, i. e., not only to consecutively visit the different doctors of the smaller towns, but also to travel to larger centres, seeking additional advice and care; whereas, under ordinary conditions, such

peripatetics would be more inclined to restrict their travels and to be contented with the local physicians.

In rebuttal, the Reference Committee stated that all these facts had been duly presented, in earlier sessions, to such Committee, and had been carefully considered; that now the said Reference Committee were open to all arguments and amendments that would help correct abuses and conditions deemed unfavorable to the men in the field. What now was desired from the House of Delegates was some decision that would best suit the present conditions, as a whole. The Committee admitted that what had been stated in these sessions was well justified in being brought to the attention of the House.

These discussions were had in view of the fact that earlier the annual report of the Committee on Medical Economics had been referred to the Reference Committee, for consideration not only by this latter Committee, but also for consultations with that Committee of such persons who might be interested in appearing at these hearings.

Dr. FRANK DARROW, of Fargo: Mr. President, I think I can wind this up. I think the only way to dispose of this at this time, is to phrase this in general terms, following this discussion, in such a way that our Economics Committee will make the best arrangements possible under the circumstances; and that the Economics Committee take into consideration the discussions that we have had here, and endeavor to be sure that these clients are indigents.

Motion seconded, and carried.

The third meeting of the House of Delegates, May 8, 1939, terminated at 10:20 P. M.

*Electrically recorded by Philip E. Parbury.

The following programme was carried out in its entirety:

SCIENTIFIC PROGRAM

May 9th, 1939

Morning Session

- 9:00—Diagnosis and Management of the Surgical Gall Bladder—E. M. Jones, M.D., St. Paul, Minn., Associate Prof. Surgery, University of Minnesota.
- 9:45—Maternal Mortality in North Dakota—John H. Moore, M.D., Grand Forks, North Dakota.
- 10:15—View Exhibits.
- 10:30—Medical Conditions Complicated by Pregnancy—Ralph A. Reis, M.D., Chicago, Ill., President of the Central Association of Obstetrics and Gynecology.
- 11:15—Syphilis—Problems in the Treatment of Syphilis—H. E. Michelson, M.D., Minneapolis, Minn., Prof. Dermatology, University of Minnesota.

Afternoon Session

- 2:00—Dermatology for the General Practitioner—H. E. Michelson, M.D., Minneapolis, Minn., Prof. Dermatology, University of Minnesota.
- 2:45—Medical Legislation—L. W. Larson, M.D., Bismarck, North Dakota.
- 3:15—View Exhibits.
- 3:30—Diagnosis and Treatment of Eye, Ear, Nose and Throat Conditions, which are of particular interest to the general practitioner—A. D. McCannel, M.D., Minot, North Dakota.
- 4:15—Office and Hospital Management of Ano-rectal Diseases—L. A. Buie, M.D., Rochester, Minnesota.

Evening Session

At 7:30 P. M., the annual banquet was held at the Gardner Hotel, Dr. Frank I. Darrow, of Fargo, presiding. Dr. W. H.

Long, President, read his Annual Address, and Dr. Frank L. Eversull, President of the North Dakota Agricultural College, gave the Annual Oration.

May 10th, 1939—Morning Session

- 9:00—Emergency Orthopedic Problems—Harry J. Fortin, M.D., Fargo, North Dakota.
- 9:45—Encephalitis—Jos. P. Leake, M.D., Washington, D. C., U. S. Public Health Department.
- 10:30—View Exhibits.
- 10:45—An Approach to Some Common Behavior Problems—F. C. Rodda, M.D., Minneapolis, Minn., Prof. Pediatrics, University of Minnesota.
- 11:15—Diagnosis and Treatment of Cardiac Emergencies—F. J. Hirschboeck, M.D., Duluth, Minnesota.

Afternoon Session

- 2:00—The Indication and Technique of Artificial Pneumothorax, Thoracoplasty and Extrapleural Pneumothorax in the Treatment of Pulmonary Tuberculosis—G. A. Dodds, M.D., San Haven, North Dakota, superintendent, State Tuberculosis Sanatorium.
- 2:45—Arterial Hypertension—Prognosis and Management—S. Marx White, M.D., Minneapolis, Minn., Prof. Internal Medicine, University of Minnesota.
- 3:30—View Exhibits.
- 4:00—Diagnosis and Treatment of Gastro-intestinal Hemorrhage—F. J. Hirschboeck, M.D., Duluth, Minnesota.

During the afternoon sessions, Dr. W. H. Long, the retiring President, expressed to the assembly his great appreciation of the honor which had been conferred upon him by electing him to that office. Dr. H. A. Brandes, of Bismarck, was then inducted into the office of the President. Dr. Brandes, too, acknowledged the honor of the office, and expressed his hope that he also might be of service to the Association.

Presidential Address

W. H. Long, M.D., Fargo, North Dakota

Mr. Chairman, Guests of the Association, Fellow Members: I wish first to express my thanks and those of the Association to our visiting guests, who have given so generously of their time and effort to make our scientific session a successful one. Then, I should like to thank you for the privilege and honor of serving you as President the past year. The work has been stimulating and rather exacting, but entirely pleasant, due to your kindly and efficient coöperation.

You are too familiar with our problems of economics and relief to relish any recitation of them. There are certain lessons we have painfully learned by our brief contact with widespread Governmental medical assistance. In 1933 and 1934 the people of a large part of our state were in dire distress due to depression and drought. As an emergency measure we embarked on a program of medical federal relief. This plan was workable and just to both the donors and recipients in its first years. Our agreements were renewed on the basis of our earlier experiences. But we have seen how false the compilation of statistics of a few months proved to be in affording a basis for computing the continued cost of this project. The two dollars per family per month, which was adequate in the first months, has proved entirely too small for later demands.

We have also seen how the interpretation of lay officials in extending the scope of our plan has led to the inclusion of many families and hundreds of individuals who should never have been included. The policy of high pressure salesmanship; the inclusion of individuals who have received but minimal government aid, such as seed loans; the carelessness with which dependents were listed, have all contributed greatly to its failure. Another important adverse factor was the failure of lay officials to make clear to the recipients that the scope of this program was for emergency service only.

You have sent your representatives to this meeting well instructed on these subjects and I am sure their expressions in the House of Delegates will greatly aid your officers in shaping our policy for the ensuing year.

There is emphatic belief throughout our profession in its ability to solve the problem of adequate medical service to all. The acuteness of our needs in past years has led to some costly errors. But as long as we insist upon our just part in shaping these programs, these errors may still be corrected.

That this adequacy of our profession to serve the needs of our people is not concurred in by all is well shown by the trend in National medical legislation, the national polls and the abundance of lay discussions in the popular magazines of the past years. All these efforts to displace the old and start the new schemes are but a part of a similar trend in our whole political and economic life. I do not feel that it is a reflection upon us in the sense of failure in the past but is the result of this overwhelming urge to change all manner of things.

Our part in shaping these changes that seem bound to come must consist in insisting that there be no relaxing of the high standards of service rendered. These high standards of service are the results of years of striving for our own professional betterment under the private system of practice with the stimulation of individual competition. Its achievements certainly stand well the comparisons with those of other systems in vogue elsewhere in the world. Also we must insist that any plan for providing adequate medical care for all, at a price which is fair for all the people also must include fair remuneration for those who render that service.

The medical man is a peculiar hybrid. He is mostly a scientist, less a business man, least a politician. His devotion to his patients and to the demands of sickness enslaves him. His attention to his political and economic state is one of almost complete neglect. Therefore, in these matters he must look to organized medicine to protect his interests. Our organization is one of the most democratic possible in its form; hence its success depends most upon the energies and behavior of its members. Its officers may make mistakes of policy and of execution, but its success is your success. Therefore, I urge upon every individual the necessity of whole-hearted coöperation in every undertaking sponsored by either your local or national association.

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Faradic Shock Treatment of the "Functional" Psychoses*

A Preliminary Report

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CONSIDERABLE interest has arisen in the therapeutics of the mentally ill since Sakel's¹ startling discovery of the use of insulin shock for the treatment of schizophrenia. Metrazol,² triazol,³ picrotoxin,⁴ nitrogen gas⁵ and other substances have been used since, with more or less encouraging results. In almost all of the numerous reports of shock treatment, the percentage of "cures" exceeds the number of spontaneous remissions recorded previously in the literature. Even though relapses occur in a large number of the cases, reports show that there is justification for the administration of shock treatment.

Success has been reported not only in schizophrenia, but also in psychoneurosis without psychosis, depressive psychosis,⁶ and other functional mental illnesses.⁷

With the increasing number of successful cases reported, even the most critical observer must admit that shock therapy has accomplished more than any other form of therapy used for many years. The most serious drawback to this treatment is the occurrence of such complications as joint dislocations, fractures, heart damage, permanent brain trauma, and even an occasional death.⁸ Because of the extreme fear and apprehension shown by most patients towards the treatment and because of the violent convulsions and serious complications which result at times, an extensive search for some satisfactory substitute is in progress.

THEORIES OF ACTION OF SHOCK TREATMENT

No satisfactory explanation for the success with the various types of shock therapy has as yet been offered. Sakel's hypothesis of the "neutralization of the excitant hormone" and "the blockage of the nerve cell" has not been accepted by neurophysiologists. Meduna's explanation is that a "biological antagonism exists between epilepsy and schizophrenia." He believes that epileptic attacks change the chemical, humoral, haematological and other aspects of the organism. This theory is also inadequate and inconclusive. Friedman⁹ believes that theoretically, the benefit from metrazol in mental conditions results from stimulation or irritation of the whole central nervous system to such an extent that mental "barriers" to certain thought processes are broken down, allowing these thought processes to be carried on properly. Gellhorn¹⁰ believes that insulin, metrazol and other substances used to produce convulsions benefit the patient by the production of anoxia which in turn stimulates the sympathico-adrenal system. He even believes that Dauerschlaf (deep and prolonged narcosis) by the use of barbiturates also inhibits oxidation in the brain and produces anoxia which acts as a powerful sym-

thetic stimulant, thereby producing beneficial results. Jackson and Jackson¹¹ have expressed the belief that the sudden powerful rise of the systemic blood pressure caused by acute convulsions forces open the brain capillaries or large cerebral vessels, increasing the flow of blood to the brain supplying sufficient oxygen to the cerebral cells which were depressed by some obstruction to the blood supply. Reese and Vander Veer¹² believe that shock treatment produces an unusual disorganization and reorganization gradually blotting out the psychopathological patterns. Because of the extreme terror and fear experienced by most patients undergoing this treatment, the theory that patients responded favorably because of the "death threat" has been advanced by some.

SHOCK AND SUGGESTION ARE THERAPEUTIC FACTORS

While many workers are trying to find some drug which will not produce such terror and apprehension as is incidental to these new treatments, a few feel that the intensity of the fear has a beneficial psychological effect and reclaims the minds of the patients from their mental aberrations. Obendorf¹³ states, "It seems to me that psychological shock and fear reaction may bring about an analogous interruption, perhaps in the habitual organic structural currents which have been established by thought habits. Such interruptions may produce a change which permits reorganization and readjustment of the thought flow thereby acting as a therapeutic agent." Fear as a psychotherapeutic agent is old in its application. Benjamin Rush¹⁴ in his book on "The Diseases of the Mind" published in 1818, reported several cases in which fear cured psychoses. A treatise published during the eighteenth century¹⁵ describes the use of fear in the treatment of mental disorders through such devices as ducking and the rotating chair. Deutsch¹⁶ writes of various techniques used from 1780 to 1820 in frightening the patient out of his psychosis, such as letting him fall through a trap door into a well of cold water, chaining him to a well and allowing water to rise until he is practically drowned, or by throwing him into a dungeon filled with snakes and vipers. According to Lewis (Director of the New York Psychiatric Institute),¹⁷ it is not unusual to see a patient restored to sanity as a result of a sudden emotional shock. He has reported several such cases.

Metrazol injections provoke so much fear and apprehension that the patients usually protest against further treatment. Because of this experience, many writers recommend an immediate repetition of the injection if unconsciousness is not reached. The patient may remain apprehensive and disturbed for some time following an

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insufficient dosage. According to Cannon,¹⁸ experimental and clinical evidence shows that pain, fear, and rage reactions stimulate the sympathetic-adrenal system in the hypothalamic region. Gellhorn believes that anoxia resulting from insulin and metrazol treatment stimulates the same region.

Practically none of the writers who have written on shock therapy considered the importance which suggestion plays in the treatment. With the reassurance that the shock treatment will benefit the patient in spite of its unpleasant nature, indirect suggestion is definitely active. The patient has concrete and visible evidence that something is being done for him. It is a foible of human nature which assures the acceptance of concrete things with greater readiness than mere assertions and persuasions of a physician. Cannon stresses the futility of trying to argue a patient out of his emotional reactions since the cortex has no direct control over the thalamus. "In contradistinction to persuasion the methods of which consist in logical exposition and argumentative proofs," Jacoby¹⁹ says, "suggestion acts by means of a direct transplantation of mental states, ideas, emotions and sensations." Therefore shock treatment may permit the physician to use other means of treatment than have been the custom, such as stimulation of the emotions and stronger indirect as well as direct suggestion.

THE USE OF ELECTRICITY IN THERAPY

Electricity has been used in the treatment of mental illnesses for many years. Richard Lovett, a lay clerk of Worcester Cathedral in 1756 treated a large number of cases with electrical shocks.²⁰ He claimed success in almost every known disease entity. Since his time, for over a century, electricity was considered by many as a universal panacea. Huff²¹ in 1853 states, "No nervous affection whatever should be regarded as incurable until electricity has in some form been tried." Arndt²² in 1870 and Allbutt²³ in 1872 were the first to report systematically and in detail, studies of cases of insanity treated with electric shock treatment. Their findings were so encouraging that this form of treatment became quite popular for many years. Arndt reported best results with "simple depression and marked apathy." Allbutt reported "marked improvement in primary dementia, and a distinct improvement in manic and atonic melancholia." In 1883. Erb²⁴ discussed the vasomotor effects of electricity and wrote, "It is a matter of experience that vasomotor disturbances play a predominant part in the development and symptomatology of many psychoses." Havnes²⁵ in 1884 observed that, "Recent cases and functional diseases are benefited by electrical treatment while old cases and structural diseases resist its influence." This statement is identical to the experience of those using shock treatment today with insulin, metrazol, and the like. Blandford²⁶ in 1886 when discussing the encouraging results he obtained, wrote, "I am inclined to think in several cases the effect was moral rather than physical." But interest in electrical shock

treatment gradually waned and by the beginning of this century the treatment was no longer popular. The loss of interest may be due in part to the fact that all kinds of cases were treated, for psychiatry was not developed as it is today and differentiation between organic and functional diseases was not as well established. Also it became generally accepted that electricity was used simply because of its suggestive action and its use as a specific was shown to be unfounded; hence, physicians lost their faith in its efficiency.

With the introduction of various types of shock therapy by means of different chemical substances, Bini²⁷ in 1937 suggested that electricity could be used as a physical means of producing epileptic attacks in place of chemical substances. By the passage of "street current" (120 volts) for a very short time (1/20 to 1/15 second) through the entire body of a dog, placing one electrode in the mouth and the other in the rectum, he was able to produce typical epileptiform seizures. The animal lost consciousness for one to two minutes. Bini described widespread and severe alterations in the nervous system and concluded by stating, "The alteration met with in animals does not permit us to exclude the possibility of these physical methods in human therapy, and that the changes may be responsible for the favorable transformation of the morbid psychic picture of schizophrenia." Cerletti and Bini²⁸ had the courage to shock a number of patients into convulsive seizures and unconsciousness, using from 300 to 600 milliamps and 80 to 115 volts from 5/10 to 7/10 of a second. They report results as good as those obtained from pharmacological shocks. A current of such high milliamperage and low frequency is apt to produce severe changes in the central nervous system.

On the basis of observations and experiences of the various treatments described above, it occurred to the writer that a physical agent which could provoke physiological reactions without producing harmful physical complications should be tried. Faradic shocks, though of a harmless nature, provoke fear and apprehension such as is experienced in other forms of shock therapy. With this premise the writer has tried a new form of treatment in psychoses.

DESCRIPTION OF APPARATUS AND TECHNIQUE

With the aid of Dr. W. J. Ferguson of the staff of the Minneapolis General Hospital, a simple apparatus was devised for the production of a faradic current. The source of the high potential current used for stimulation was a Model "T" Ford spark coil; a six-volt dry cell battery of the "A" type was used to energize the spark (induction) coil. A resistance of 500,000 ohms (wire wound) was used in series with the secondary winding of the induction coil to reduce the milliamperage of the current used. The maximum voltage produced was approximately 20,000 volts. Without the wire wound resistance, the maximum voltage is approximately 19,000 volts. Cambridge E. K. G. electrodes and Cambridge electrode jelly were used. One electrode was placed on

the forehead and the other on the nape of the neck.

The patient's breakfast is withheld and an enema is given before the commencement of the treatment. From five to ten shocks of one second's duration each are given with one second intervals between each shock. Such current can be safely tolerated in patients having no vascular disease. Physiological changes produced with such stimulation are reversible and harmless. The patient's eyelids and facial muscles twitch, the head jerks, and evidence of fear and pain is exhibited. The patient does not appear to be in mental anguish or to have the violent jerking as is seen in convulsions.

Immediately after the electrical shocks are given, pentothal sodium is injected intravenously to produce prompt sleep. This drug has been used extensively since 1935 as a general anesthetic for short operative procedures. From 4 to 7 cc. of a 5 per cent solution (50 mgm. per cc.) is injected slowly as is recommended by the manufacturers of the drug. Surgical anesthesia is attained in about thirty seconds. Unconsciousness lasts for several minutes depending upon the amount of the drug administered. When the patient becomes unconscious, the respirations are shallow. As with all barbiturates, death results from respiratory failure; for this reason the respiration must be watched very closely. A cotton butterfly²⁹ made of a wisp of cotton is attached to the upper lip with one wing overlying the nostrils and the other wing overlying the lips, to note the pulmonary exchange of air. Only an expert anesthetist or one well versed in its administration and its dangers should employ pentothal sodium. By the administration of an inhalant such as spirits of ammonia, the patient may be kept awake. Thus, the interviewer often may gain much information of the content of his thought, which is not obtainable at other times. This same method is employed after the intravenous injection of sodium amylal.³⁰

From ten to twenty daily treatments are recommended.

DISCUSSION

According to K. Wilhelm Stenstrom,³¹ professor of biophysics, University of Minnesota Medical School, currents obtained by the method employed are safe for the following reasons. The wattage drain of the spark coil and battery used is approximately 20 watts (6 volts \times 3 to 4 amperes). The output wattage must be the same or less. Since the secondary coil has a great resistance and the efficiency is below 100 per cent, the output wattage must be less than the input. The maximum voltage produced is approximately 20,000 volts without the resistance. Therefore 1 milliamperes average current is the maximum output although the instantaneous current is much higher. Very little current is conducted through the heart by this method. Fifty milliamperes of low frequency sinusoidal current are used often for muscle and nerve stimulation; in diathermy much heavier voltages and amperages are used without causing tissue damage. The frequency produced by the induction coil described above lies between that

of the low frequency stimulators and that of the diathermy apparatus, but close to the latter.

The electrodes are placed on the forehead and neck because in that position there is less danger of affecting the heart action, and because of its use in suggestion. By the employment of faradic shock, psychological effects from the stimulation in all probability affect indirectly the hypothalamus (autonomic functions) as do insulin and metrazol treatment, but with far less danger of serious complications. With the use of a fast acting and powerful anesthetic, the patient is relieved of fear and apprehension which follows physiological or pharmacological shock and a more satisfactory condition for the introduction of psychotherapy is created. Jacoby has stated, "Whatever benumbs the power of judgment and resistance, whether it be fear, passionate excitement or a strong hypnotic will, enhances the use of suggestion." Janet³² made the following statement, "The psychotherapist who understands his patient well and who knows how to use psychological stimulation succeeds with any method he cares to use."

The writer does not believe that schizophrenia is actually "cured" by either insulin or metrazol, but that their administration probably interferes with the various habit patterns of diseased thought processes and permits the therapist to replace them with healthy ideas by means of psychotherapy. Not only schizophrenia, but other forms of functional illnesses have been reported to respond favorably to various means of shock therapy. It is generally accepted that good results are not obtained in advanced cases. Friedman emphasizes the need for reeducation of the patient by means of occupational milieu and psychological therapies in conjunction with insulin and metrazol treatment. Even Sakel advocates psychotherapy as a necessary adjunct to shock therapy. Meduna³³ has stated, "Far from considering the convulsion therapy as the only possible way of curing schizophrenia, I think that it is only a first step on the as yet unaccustomed biologic road of influencing the schizophrenic process. It is necessary to try other substances, as well as to search for the factor mobilized by the convulsion and causing its beneficial effect. In this way it will perhaps become possible to eliminate the convulsion and apply only its secondary effects."

The method of treatment described in this paper is another means of approach to a very intricate problem. It may clarify some of our knowledge as to the proper form of treatment of psychoses and psychoneuroses and it may offer some new understanding of the mechanisms involved in these conditions. One of the main advantages of this treatment is the minimal amount of danger it entails.

This form of treatment has been tried on a small series of "functional psychoses" with very encouraging results. Because of the small number of cases treated and the short period of time for observations, no definite conclusions can as yet be formed. It may be possible that this method may be an adequate substitute for the more drastic forms of shock therapy being used today. Further work is being done in this study.

CASE REPORTS

Case 1. E. S., female, aged 34, a high school graduate, who has been married eighteen years and has two children. The history revealed no other mental disease in the family. According to her husband, she was always quiet and reserved, and never had any previous mental illness. In August 1938 they moved into an apartment building which she disliked as she had "never lived in an apartment building before." In April 1939 she developed ideas of reference, thinking the neighbors were talking about her because she praised her husband to them. On May 9th she became restless and developed auditory hallucinations. Voices told her to end her life. She was placed in a private hospital and while there the voices told her to escape, that the building was going to be set on fire, and she feared a mob was going to lynch her. She became so disturbed that she was transferred to the Psychiatric Ward of the Minneapolis General Hospital on May 11, 1939. She insisted she heard a radio broadcast that her husband and two children were killed in an automobile accident. For hours at a time she stood motionless with a worried expression and rarely spoke even when addressed. When she did speak she talked in a low, soft, whining manner in monosyllables. She insisted that a nurse she had never seen before was someone she knew. The psychosis was characterized by paranoid trends with some depressive features. I considered it schizophrenia but some might call it a paranoid state.

On May 27th faradic shock treatments were begun following the usual method described above. They were administered daily for six days. After the fourth treatment she stated that the hallucinations had left her. After the sixth treatment she talked freely and her speech became normal. She showed more initiative and interest in her surroundings. Because of the marked improvement, the treatments were discontinued on June 1st. On June 5, 1939, she was discharged from the hospital markedly improved. On June 20th she was interviewed and no mental aberrations were revealed in the examination. According to her husband she had been acting normally since she left the hospital. The patient was happy and pleased with her recovery. She stated that she noted improvement with each successive treatment and expressed her gratitude for what had been done for her.

Case 2. S. N., male, aged 20, single. The family history was negative except that his maternal grandmother had a postpartum psychosis in her late thirties, and again became psychotic during her menopause, requiring permanent hospitalization.

He was considered exceptionally bright and finished high school with honors. In his senior year he became nervous and developed an unusual interest in girls and in religion. He decided to follow missionary work and entered a seminary. While there he studied industriously, but his grades were only mediocre. His school work became worse and he was forced to leave. He then obtained a job as a janitor in a hospital. In March 1939 he went to the county attorney and gave himself up as being responsible for the death of a patient who died following an operation. He stated that he had had a vision that the death was going to occur and he was responsible for the death because he talked to a nurse in charge of the case and to the relatives of the deceased in an elevator. He was admitted to the Psychiatric Ward of the Minneapolis General Hospital on March 7th. In the hospital he said he was worried because he had masturbated for several years and was unable to stop this practice. He talked a great deal about the Bible and insisted that he wanted to be a missionary worker. He was active, alert, and garrulous. Most of the time he talked about religion with patients in the wards. The diagnosis was schizophrenia, hebephrenic type.

He was given fifteen insulin shock treatments and showed some improvement, but still harbored delusions. He was then given twelve metrazol treatments, but showed no improvement.

After an interval of a few days he was given faradic shock treatments daily. After the fourth treatment he became very excited and required sedation almost continuously. He stated that he was not permitted to carry out God's will and tried to

injure himself by hitting his head against the wall. Because of his marked excitement and persistence to harm himself he was committed to a state hospital. Condition unimproved.

Case 3. R. K., female, aged 42, single, quite obese. Her mother developed some form of psychosis following a miscarriage at the age of 38 years and never completely recovered. The patient kept house for two older brothers on a farm. She was never considered bright and left school in the seventh grade. For twenty years she kept company with a man whom she expected to marry; she admitted having had frequent sexual relations with him. Ten years ago while riding in a car with her brothers she was suddenly startled by a man whom she believed to be carrying a revolver. Her brothers did not see the gun. She was nervous for two and a half months following this experience. Six years ago her fiance saw her less often "because she became more difficult to get along with."

A year ago she began to suspect that her fiance was untrue to her. In March 1939 she claimed she heard a rumor that he was married to someone else. She became so upset that her brothers couldn't care for her at home. They took her to a local hospital where she was treated for about two weeks. Her condition grew worse and on April 19, 1939, she was transferred to the Glenwood Hills Sanitarium. She talked about religion; frequently fell upon her knees and prayed aloud and said, "I want to die a Catholic," "Don't take away my religion," and frequently insisted on seeing a priest. She also said, "I want to be a young lady even if my hair is gray," and "I want to be a young lady and not a mother." She was negativistic, ate poorly, and showed no interest in her appearance. She constantly dug into the skin of her face with her nails. She was diagnosed as schizophrenia, paranoid trend, and mental retardation.

Nine metrazol treatments were given her. She showed some improvement after the sixth, but after the ninth treatment she appeared more lethargic and confused so the treatment was discontinued on June 6th. On June 11th daily faradic shock treatments were instituted. After the fifth treatment she stopped talking about religion. She dressed and fed herself, but talked less and continued to be suspicious and apprehensive. After fourteen treatments she was taken home in an improved condition.

Case 4. M. H., male, age 38, single, tall and undernourished. He gave a history of completing grade school at 16 years and was never a good student. At twenty-two, while playing amateur football, he received a mild cerebral concussion. He became "depressed and couldn't concentrate" for one and one-half years. In 1926 the depression re-occurred for six months. He was always shy and timid and never went out with girls. Three years ago he began to have auditory hallucinations. Previous to this time he worked irregularly as a common laborer, but has not worked since. He became more seclusive and lost interest in his surroundings. In his visions he saw a wealthy woman and said that he wanted to marry her, but could not afford to. He confessed that he had sexual relations with her spiritually. He entertained ideas of suicide and tried to end his own life by hanging, but lost his nerve and went to jail voluntarily because he believed that something was wrong with his mind. He was transferred to the Minneapolis General Hospital on May 22, 1939. There he spent a considerable time on his knees praying. He mumbled to himself, refused to eat, but drank a great deal of water saying the spirits told him to do this. He was found masturbating frequently and often urinated on the floor or in bed. He thought that the spirits were going to cut off his penis. Diagnosed as schizophrenia, paranoid type.

On June 1, 1939, daily faradic shock treatments were instituted. After the second treatment he became more talkative. After the tenth treatment he responded much better to questioning. He said, "I think that the treatment is helping me," and, "I don't feel so nervous." After the thirteenth treatment he began working in occupational therapy and said that he did not hear voices any more. He was given twenty treatments. On June 26th he conversed without being questioned, read newspapers, played cards and proudly showed his accomplishments in woodwork. The patient was anxious to return to work and was discharged July 12th as markedly improved.

At the present time the writer is reporting only the first four cases treated with faradic shocks and pentothal sodium. No selection of cases was made and all available cases of functional psychosis were treated.

Case 1 made a total recovery. This case might have recovered without any form of treatment, but it is apparent that the duration of the disease has been shortened.

Case 2 showed no improvement, but he did not respond to fifteen insulin or to twelve metrazol treatments. He was committed to a state hospital after he received only four faradic treatments.

Case 3 showed no improvement after nine metrazol treatments, but she became more quiet and cooperative after fourteen faradic shock treatments. Because of her low intelligence and long unsatisfactory history, the outlook of her condition was not favorable.

Case 4 made a social recovery. Minor symptoms of shyness and shallowness of affective response were still present, but his response to the treatment is remarkable considering the long duration of his illness.

SUMMARY

An approach to the problem of therapy for "functional" psychoses has been presented. The essential features are, namely: (1) with suggestion the patient realizes that something concrete is being done; (2) with the creation of fear and pain, emotional reactions are stimulated and in turn affect the autonomic nervous system; (3) with the intravenous injection of pentothal sodium, the patient is relieved of the fear and apprehension he is subjected to by the electric current and the physician may gain much information of the thought processes which are not obtainable otherwise.

Though the results in a small series of cases so treated are very encouraging, the series is too small and the period of observation is too short to arrive at a definite conclusion. If this method proves efficacious, it will be an obvious improvement over the various methods of shock therapy described to date and it will clarify our understanding of the mechanism of shock treatment.

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Excretory Urography in Tuberculous and Debilitated Patients*

With Special Reference to the Use of Organic Iodide Dyes

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IN the diagnosis of renal tuberculosis, several methods of study may be employed. Excretory urography, a method which has proved extremely valuable in other types of pathology of the urinary tract, has been suggested but avoided on the theoretical ground that introduction of an iodine compound into the body of the tuberculous patient might make his disease worse. In short, tuberculosis has been considered a contraindication to excretory urography, and literature cautioning against use in tuberculosis accompanies the excretory dyes, all organic iodide compounds.

At the Seaview Hospital, New York City's Municipal Hospital for all types of tuberculosis, particularly advanced cases, excretory urography has been employed for the last six years in tuberculous patients requiring urologic investigation. Because of the poor physical condition of many patients, this method has in many cases been found more desirable than manipulative procedures such as cystoscopy. The patients at this institution have often related to other patients stories of the unavoidable pain following manipulative procedures. As a result, some patients have refused to permit anything but intravenous methods for diagnosis of their renal lesions. No serious reactions from excretory urography have been noted during the past six years that it has been used at Seaview Hospital.

We have reviewed 230 studies with excretory urography performed on 217 patients during 1938. In this group were males and females of all races; their ages ranged from 6 to 77 years. Most of the patients suffered from pulmonary tuberculosis. A considerable number had bone lesions and a few exhibited uro-genital tuberculosis without evidence of active disease elsewhere. This last group included several patients who had been admitted following nephrectomy for tuberculosis but in whom tuberculous sinuses persisted or other evidence of the disease still afflicted the remaining kidney. There were three non-tuberculous patients in this group. They had been admitted from general hospitals under an erroneous diagnosis.

Among the complications noted in these patients who underwent excretory urographic studies were heart disease, arteriosclerosis, hypertension, diabetes, amyloidosis and pregnancy. Some patients were undergoing surgical treatment, such as pneumothorax or thoracoplasty, for pulmonary tuberculosis, and still others were being treated for orthopedic lesions.

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No changes in the pulmonary status of these patients could be attributed to the administration of urographic dyes. Ten patients who were examined before and after excretory urographies showed no change in auscultatory or roentgenographic findings. Twelve patients, whose sputum became negative for tubercle bacilli in the six months before urographic examination, were still found to have negative sputa for at least six months afterwards. These findings are confirmed by the experience of Thomas, who observed no serious reactions following a great number of excretory urographic studies of tuberculous patients at Glen Lake Sanatorium (Minnesota). We have made a detailed analysis of the results and reactions observed in the last 100 patients on whom excretory urographies have been employed. Most of these patients were suffering from moderate to far advanced pulmonary lesions. However only a very few suffered disagreeable symptoms following the intravenous administration of these urographic dyes. The reactions were all of a minor and temporary character and varied with the type of dye used.

Neo-Iopax was well-tolerated. Only an occasional patient complained of general warmth during the injection or of a transitory cramp in the vein at the site of injection. These pains, radiating toward the shoulder, were easily relieved by mixing the venous blood with the dye in the syringe during the administration. No gastrointestinal symptoms or urticarial manifestations followed the use of this preparation.

Diodrast, used in many patients, also proved satisfactory. Nausea was the most common disagreeable feature. A number of patients vomited, had transient coughing spells, or noted a tightness or choking sensation about the throat and retrosternal region. A few patients complained of a feeling of general warmth but only one developed a generalized urticaria, which responded immediately to epinephrine given hypodermically. Pain in the arm and shoulder was not a common complaint when this dye was used.

Diodrast Compound was used on only a few patients. The urographic results were excellent but several patients developed urticarial reactions and others suffered gastrointestinal upsets.

TECHNIC OF EXCRETORY UROGRAPHY

Preparation of a patient before excretory urography must be carefully followed through. The patient receives a laxative, such as Compound Licorice Powder (the adult

dose is three drams), at 6 P. M. on the evening before the urographic studies are to be made. After 8 P. M., he receives no more food or fluids until the studies have been completed. A soap sud enema is given early the next morning, especial care being taken not to introduce air into the large bowel.

If the patient has been in bed for a long time or has been in the custom of receiving sedatives at bedtime for a prolonged period, additional thorough cleansing is necessary to eliminate gas retention in the bowel. We tried Pitressin or Prostigmine for one month, since these drugs have been reported to be effective in eliminating gas in the bowel. Although no serious reactions were encountered, some patients complained of marked discomfort and became alarmed following the administration of these drugs.

On the next morning, appropriate amounts of the organic iodide dyes (20 cc. for an adult) are administered intravenously. The time required for injection is from 3 to 4 minutes. Patients with active pulmonary lesions should be masked if they cough. Should spine or hip lesions be present, the suprapubic compression bag must be applied with caution.

The roentgenographic films are taken 10, 20 and 60 minutes after the administration of the dye. We believe that one of these pictures should be taken in the Trendelenberg position and another in the exaggerated Fowler's position. However, many patients with pulmonary disease complain of difficulty in breathing when they are placed in the Trendelenberg position.

DISCUSSION

The objection to the use of organic iodide dyes in tuberculosis patients has depended upon several theoretical considerations. In the first place, the permanence of the iodine linkage in the organic combination is not known. Hence the amount of free iodine in the body which might be found after intravenous administration of the dye has not been determined. The objection to using inorganic or free iodine in tuberculous patients is that this drug is known (1) to change the character of the sputum and is assumed (2) to precipitate the breakdown of healing scar tissue in tuberculous lesions. It has been thought that the usual thick mucoid bronchial secretions envelop and eliminate free tubercle bacilli which might otherwise reinoculate uninvolved portions of the pulmonary tree. It has been suggested by Orn-

stein that the profuse expectoration following iodide administration dangerously and unnecessarily dilutes the mucoid sputum.

Since severe reactions have occasionally been reported following injection of organic iodide dyes, caution, perhaps unwarranted, has been responsible for establishing the concept that these dyes were contraindicated in debilitated patients.

We have found no evidence to contraindicate the use of the excretory method or urography with organic iodide dyes in tuberculous debilitated patients. In the first place, the amount of iodine in any single injection dose of the common intravenous dyes varies between 4.5 and 7.5 grams. In the presence of even fairly adequate kidney function, most of it will be excreted and only a very small amount may theoretically become free iodine.

The roentgen films taken in our excretory urographic studies of tuberculous patients were no less satisfactory than those taken of non-tuberculous patients. Obviously, excretory films are not as definite in urinary tract outline as retrograde studies. However if patients cannot be catheterized because of a necrotic tuberculous bladder, or because of the presence of a tuberculous ureteral obstruction, excretory films give adequate anatomic information.

SUMMARY AND CONCLUSIONS

Excretory urography, employing organic iodide dyes, has been employed in all types of tuberculous and debilitated patients at Seaview Hospital for the past six years. No serious reactions have occurred.

An analysis has been made of the reactions occurring in 100 tuberculous (pulmonary tuberculosis) patients studied with excretory urography during 1938. Only minor and transient reactions were noted following the administration of organic iodide dyes.

Tuberculosis is no contraindication to excretory urography.

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A Study of Physical Examination Records in Use in Health Services*

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In an attempt to determine the possibility of arriving at some uniformity of content of the physical examination records now in use in college health services, a letter and questionnaire were sent to every college having membership in the American Student Health Association. The letter solicited frank opinion on the value of the survey and outlined the project. We suggested the possibility of formulating a type of physical examination record that might be adaptable to various types of health services as follows:

1. Those depending upon a school nurse and members of the physical education staff to make the physical examination (this examination to include such items as measurements, posture, vision, hearing tests, etc.),
2. Those with a part-time physician staff or insufficient physician and laboratory facilities to give a comprehensive physical examination, and
3. Those with adequate physician and laboratory staff, including specialists.

In working toward this type of a record we would not lose sight of the fact that the only entirely satisfactory examination is a complete one done by a physician staff and followed by laboratory tests as indicated. On the other hand, we recognize the fact that a limited examination is of more value than no examination at all. In this case the examiners must recognize their limitations, and not give the impression that a rapid physical survey fills the requirements for a complete examination.

The increasing demand for certificates of physical fitness emphasizes the importance of establishing accurate and useful tests. For example, the ordinary physical examination of the chest, without X-ray and tuberculin test, does not warrant the examiner's stating that the patient is free from pulmonary disease. Nor should we tag a patient with a diagnosis of valvular heart disease on the basis of stethoscopic examination alone.

At the time of tabulation of returns on the questionnaires December 22nd, we had received 101 replies to 140 letters sent.* One hundred schools sent copies of their records, and these records have been arranged for display. We take this opportunity to thank those who cooperated in the survey by returning the questionnaire, by expressing their opinions in letters and by sending copies of their records.

Opinions as to the value of the survey and the desirability of establishing uniform content of the physical examination record were varied. Many writers were outspokenly against any form of standardization or "regimentation". Attention was directed to a previous survey made by another group (American Physical Education Association), and to the slow response to adopt the outline for routine physical examinations proposed by the American Medical Association. One writer brought up the problem of the value of minute examinations in relation to the time and money involved. Another large group replied that they were not satisfied with their present records or were considering a change in the records now in use and would welcome a study of the problem.

Detailed replies to the questionnaire are given below:

1. Do you believe there is sufficient need for uniform physical examination records to warrant a study by the American Student Health Association?

Yes	73%
No	11
Doubtful	14
No reply	2

2. Do you believe practical the suggestion to work out a standard physical examination record adaptable to schools having:

a. No physician staff (only school nurse and physical education staff):	
Yes	63%
No	23
Doubtful	8
No reply	6
b. Limited physician staff:	
Yes	74%
No	6
Doubtful	17
No reply	3
c. Complete physician and laboratory staff:	
Yes	76%
No	8
Doubtful	13
No reply	3

3. Following the classification in question 2 what routine laboratory tests should be included under Part II:

Urinalysis	76%
Hemoglobin	15
Blood count	9

Part III:

Urinalysis	81%
Hemoglobin	34
Blood count	27
Blood chemistry	3
Serology	1

4. Following the classification in question 2 what other diagnostic tests should be included under Part II:

Tuberculin test	67%
Wassermann test	27
Schick test	15
Dick test	11

Part III:

Tuberculin test	84%
Wassermann test	64
Schick test	37
Dick test	32

5. Following the classification in question 2 what X-ray examinations should be included in Part II:

Chest X-ray	71%
Fluoroscopy, chest	2
X-ray teeth	1

Part III:

X-ray chest	83%
Chest fluoroscopy	4
X-ray teeth	1

In response to the request to check on a copy of their physical examination record the items that would be classified under Part I, Part II and Part III of the examination, only fifteen records were so divided. From this relatively small amount of data, and the data given on the questionnaires the following items are grouped under the three main headings, and represent roughly the points to be covered in the various types of examination. Each item in these lists was agreed upon by approximately half, or more, of those replying to the questions.

Part I—(Examining staff consisting of nurse and physical education faculty.): Age, height, weight, measurements, skeleton, posture, extremities, nutrition, skin, vision (Snellen), hearing (watch or voice), teeth.

*Several additional replies have been received since.

*Presented before the American Student Health Association, New York City, December 29, 1938.

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Part II—(Limited physician and laboratory staff): Age, height, weight, measurements, skeleton, posture, extremities, nutrition, skin, vision (Snellen), ears: hearing (watch or voice), drum; teeth and gums, mouth and throat, nose, thyroid, heart: blood pressure, pulse; lungs: chest X-ray, tuberculin test; abdomen, genitalia, hernia, varicosities, neuro-muscular system, urinalysis.

Part III—(Complete laboratory and physician staff): Age, height, weight, measurements, skeleton, posture, extremities, nutrition, skin, eyes: vision, color vision, refraction, if indicated; ears: hearing (audiometer), drum; teeth and gums by dentist or dental hygienist, X-rays as indicated; mouth and throat; nose, including transillumination of sinuses; thyroid, including basal metabolism test, if indicated; heart: blood pressure, pulse, electrocardiogram and X-ray, as indicated; lungs: tuberculin test, chest X-ray; abdomen, genitalia, hernia, varicosities, neuro-

muscular system, urinalysis, blood count, Wassermann test; Schick test, Dick test; (other tests as indicated).

CONCLUSIONS

1. A majority of the directors questioned indicated there is an opportunity for revision of physical examinations now in use in many schools to make them more nearly uniform in content.

2. There is lack of agreement as to the laboratory and diagnostic tests considered to be of value in the routine examination.

3. Local conditions and staff preferences govern largely the type and content of the records now in use.

4. If revision of physical examination records is undertaken, it should be along the lines of advising as to content of the record rather than the development of a standard form.

A Biometric Study of Sedative Medication*

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Brooklyn, New York

IN view of the marked prevalence of sedative drugs in medical prescriptions, it might be well to consider and compare certain properties and characteristics of the major groups—the bromides and the barbiturates.*

Since it is almost impossible to test all of the bromides or barbiturate compounds, it was decided to select representative preparations of each of these two groups.*

Controlled animal experiments were performed with three objects in view:

First, to determine the minimum lethal dosage of the bromide as compared with that of the barbiturate.

Second, to determine the effects upon longevity and behavior of using multiples of both drugs continuously over periods corresponding to animal-man years.

Third, to determine whether susceptibility of animals to these drugs is increased or decreased by long continued medication with the same.

TOXICITY STUDIES

In the present experiments, a direct comparison was made of the minimum lethal dosage and toxicity of the bromide and the barbiturate, respectively, using rabbits and albino rats obtained from the same litters as the test animals. All animals were fed and housed under identical conditions. In all, 18 rabbits and 13 albino rats were used for this experiment.

*Neurosine was chosen to represent the bromides, and barbital the barbiturates. Neurosine was chosen for the investigation because of its very extensive use by physicians in symptomatic treatment of neurasthenia, hysteria, insomnia, epilepsy, alcoholism and menopausal neuroses. Neurosine contains approximately 30 grains each of sodium, potassium, and ammonium bromide together with three-fifths grain of zinc bromide, supplemented by small quantities of the therapeutic adjuncts belladonna, henbane and lupulus and laxative cascara sagrada.

Barbital is considered to be the most important of the barbiturates. Not only is it the first of these substances used and still widely employed in medicine, but it is also the substance from which the other barbiturates are derived. Barbital likewise serves as the basis of comparison of action, efficiency and dosage for its varied derivatives.

The therapeutic dose of the barbiturate is 0.0047 gram per kilo of body weight. This is computed from the U. S. P. dose on the basis of animal weight. For the rabbits the weighed amount of the barbiturate, in the multiple of the therapeutic dose desired, was placed in gelatine No. 0 capsules and forced down the esophagus by means of a glass rod.

The therapeutic dose of the bromide for rabbits was computed on the basis of the recommended dose (2 drams) for man. A dessertspoonful or 8 cc. per 70 kilo man corresponds to 0.114 cc. per kilo. Thus 0.114 cc. per kilo was used as the therapeutic dose for the rabbit. The measured amount of the bromide, in the needed dosage multiple, was introduced by a syringe through a No. 14 French catheter, directly into the stomach.

From these data it was found that the minimal lethal dose of the barbiturate for rabbits is 0.24 grain per kilo of body weight or 50X the therapeutic dose. This corresponds to 16.3 grams for a man weighing 150 pounds. The minimal lethal dose for rabbits of the bromide was found to be 6.8 cc. per kilo of body weight or 60X the therapeutic dose. This corresponds to 462 cc. for a man weighing 150 pounds.

A similar series of comparative toxicity tests was made by using albino rats. A measured amount of the barbiturate was agitated in water and introduced by a glass syringe through a No. 10 French (rubber) catheter directly into the stomach. In a like manner measured amounts of the bromide were administered.

From these studies it was determined that the minimal lethal dose of the barbiturate for albino rats is 0.188 gram per kilo or 40X the therapeutic dose, corresponding to 12.3 grams for a man weighing 150 pounds. The minimal lethal dose of the bromide for albino rats was

found to be 9.1 cc. per kilo or 80X the therapeutic dose, equivalent to 619 cc. for a man of 150 pounds.

LONGEVITY TESTS

A study was made of the effects of long continued medication with the barbiturate and the bromide, respectively, as compared with control animals receiving no medication. For this purpose rabbits and albino rats were observed over periods of weeks corresponding to human years on the basis of comparative longevity. Identical multiples of the therapeutic doses of both drugs were used. Observations were made upon longevity, behavior, activity and weight changes.

One year of a rat's life is equivalent to thirty years in a man's life. Its period of growth extends over approximately 300 days, its life span being about three years. Thus rats live their cycle at approximately 30 times the rate of the human species. The rats were observed for a period of ten weeks or approximately six man-rat years.

Similarly, one year in a rabbit's life is equivalent to ten years in a man's. The rabbits were observed for a period of ten weeks or approximately two man-rabbit years.

Rabbits and albino rats were used for these experiments. Animals from the same litters were divided proportionately among the experimental and control groups. The animals were kept in separate wire-mesh metal cages. The temperature, humidity and fresh circulation of air were kept constant by means of a vacuum pump. Cages were changed and fresh paper was placed on the floor twice daily.

The reaction of rabbits and rats to continued medication with 2X and 5X the therapeutic doses of the bromide and the barbiturate was studied. For this experiment, 23 rabbits and 72 rats were used.

A special solution of the barbiturate or the bromide was made for each rabbit or rat. This was calculated so that a convenient and uniform amount, such as 3 cc. for example, could be administered three times daily. The factors used in the calculation included the multiple of the therapeutic dose and the animals' weight, so as to make up the proper dilution.

Both the bromide and the barbiturate were administered in the same manner in all animals. The measured amount of solution was drawn into a graduated glass pipette with a rubber bulb at one end. The pipette was slipped down the animal's throat to the esophagus and emptied.

Comparing the two groups of rabbits treated with 2X the therapeutic dose of the barbiturate and the bromide respectively, it will be noted that none of the four barbiturate-treated rabbits lived longer than three weeks, while three of the four bromide-treated rabbits were alive at the conclusion of the experiment after ten weeks (equivalent to two man-rabbit years).

Comparison of the two groups treated with 5X the therapeutic dose of the barbiturate and the bromide, respectively, shows that the survival records were definitely better in the bromide-treated group. However,

one of the barbiturate-treated rabbits survived the entire period of ten weeks. This animal showed an unusual degree of resistance to the barbiturates. It was the only animal surviving longer than two weeks.

SURVIVAL INDEX OF RABBITS

The *survival index* affords a mathematical expression of the effect of the barbiturate and the bromide medication, respectively, upon longevity. It expresses, in terms of percentage, the number of animal-weeks survived as compared with the sum total of weeks which would be possible if all animals survived the entire experiment. A correction factor is applied on the longevity record of the controls, so that each survival index computed compares the record of the group under consideration with that of the controls.

The survival index of the five groups of rabbits is as follows:

Controls (correction factor)	87%
2X barbiturate-treated (corrected)	23%
2X bromide-treated (corrected)	92%
5X barbiturate-treated (corrected)	40%
5X bromide-treated (corrected)	66%

There was a striking difference in the behavior of the barbiturate-treated animals as compared with those of the bromide-treated groups. The latter had stronger muscular tonus and better posture and took better care of their skin and fur. The activity of the animals was observed closely throughout the period of observation.

The 2X bromide group showed slight reduction of activity as compared with the controls, and their activity was much greater than that of the 2X barbiturate group. The 5X bromide group also proved much more active than the 5X barbiturate group. The activity of the 5X bromide animals was likewise greater than that of the 2X barbiturate group after the first two weeks. The level of activity in the 5X barbiturate group was maintained by the single survivor, who seemed to possess an abnormal degree of resistance to the barbiturate.

The animals were weighed daily. This was a necessary factor in computing the dosage, which was based on the animal's weight. Since the weight changes afforded no information of scientific importance, they are omitted from this report.

SURVIVAL INDEX OF RATS

As in the case of rabbits, the survival index was determined in the five groups of albino rats.

Comparing the two groups of rats treated with 2X the therapeutic doses of the barbiturate and the bromide, respectively, six of the twelve rats survived the ten weeks' period in each case. However, the longevity record of the barbiturate-treated group was rather better in this comparison, as will be shown by the survival index.

Comparing the two groups of rats treated with 5X the therapeutic dose of the barbiturate and the bromide, respectively, seven of the twelve bromide-treated rats survived the ten weeks' period as compared with two for the barbiturate-treated group. Furthermore, the

longevity record of the bromide-treated group was decidedly better as will be shown by the survival indices.

The survival index of the five groups of albino rats is as follows:

Controls (no correction factor needed).....	100%
2X barbiturate-treated	79%
2X bromide-treated	62%
5X barbiturate-treated	28%
5X bromide-treated	81%

The survival index and longevity record were definitely better in the 5X bromide-treated rats than in the 2X bromide-treated group. This was paralleled by the greater physical activity of the animals in the former group. This apparent discrepancy is readily explained by the general occurrence of diarrhea in the animals of the 5X bromide-treated group, due to the laxative content of the preparation. This diarrhea apparently served as a safety factor against lethal intoxication by eliminating excess medication from the intestinal tract.

There was a striking difference in the behavior of the barbiturate-treated animals as compared with those of the bromide-treated group. The latter had strong muscular tonus, better posture and took better care of their skin and fur. The activity of the animals was watched closely throughout the period of observation.

The 2X barbiturate group showed least reduction of activity, while the 5X barbiturate showed the greatest reduction. The 5X bromide group showed less reduction of physical activity than the 2X bromide group. This apparent inconsistency would appear to be due to occurrence of diarrhea in the 5X group, which not only caused evacuation of excess medication but also kept the animals more active looking for food.

The animals were weighed daily, as was required for computation of the dosage. From the standpoint of comparison, the weight changes were not regarded as significant and are therefore omitted from this report.

EFFECTS OF PROLONGED USE ON SUSCEPTIBILITY

Additional experiments were performed to determine whether the animals surviving the longevity experiments had increased or decreased their susceptibility to the drugs previously administered.

There were five surviving rabbits. After the tenth week, these animals were kept without medication for one week. Respective treatments were then resumed for one week and all rabbits acted, to all intents and pur-

poses, the same as the normal control animals. Apparently they had developed immunity to the identical dosage of the drug. During the week without medication the animals acted much the same as during the last week of treatment.

There were 21 surviving rats, which were kept without medication for two weeks. The 2X bromide survivors recovered from the depression induced by prolonged medication faster and more completely than the 2X barbiturate survivors. The 5X bromide survivors likewise recovered from their depression, while the 5X barbiturate survivors failed to regain normal activity and behavior. After the two weeks' rest, all the rats were again placed on their respective medication. There was slowing up of activity and the animals became as quiet and depressed as in the first experiment.

All the rabbits and eleven of the rats were then used for further experiments on minimal lethal dosage. The findings in these experiments were recorded. Autopsies showed no lesions in the vital organs of any of the animals. A 2X barbiturate rat survived 60X the therapeutic dose and a 5X barbiturate rat survived 120X the therapeutic dose, indicating increased tolerance due to habituation. In the case of rabbits, although all of them showed reduced susceptibility to the barbiturate and the bromide, respectively, so far as their behavior was concerned, the experiments failed to establish evidence that the minimum lethal dose was affected materially by the prolonged period of treatment.

CONCLUSION

The widespread use of sedative drugs has prompted this investigation and comparison of bromides* and barbiturates.** From the evidence gathered it would appear that the bromides are far preferable to barbiturates for inducing sedation because:

1. The margin of safety between the therapeutic and minimal lethal doses of the bromide is greater than that of the barbiturate.
2. After long-continued medication the bromide affects longevity much less than the barbiturate.
3. Recovery is more rapid and complete after the bromide than after barbiturate administration.
4. The bromide does not produce tolerance or habit formation, a known and proven danger factor in the use of barbiturates.

*Neurosine was chosen to represent the bromides.

**Barbital was chosen to represent the barbiturates.

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THERAPEUTIC PROGRESS

Detail men who call at physicians' offices have a way of stimulating meditative thought. Sometimes it is of a destructive and at other times of a constructive nature. Like the workings of metabolism, it should be both—or shall we say a little of each. It is impossible to specify the relative proportions. Mental metabolism must determine that. This calls for an analytical mind—one that can choose with wisdom what to eliminate and what to adopt. We must not only decide what to adopt, but we must also decide what, if anything, that which we adopt shall replace.

We have been told about the marvels and dangers of the sulfanilamide preparations. We learned about insulin but soon discovered that the protamine zinc preparation had the advantage by reason of a more lasting effect. We have been made well-nigh dizzy by the acrobatic antics of the carbon and hydrogen atoms in the benzene ring. New and fantastic names have been emblazoned upon the therapeutic heavens, as envisioned

through the portable telescopes of traveling representatives of pharmaceutical houses.

We are living in an age of wonders, but sitting in a golden chair involves responsibility. As judges, we must listen to these representatives' stories; we must patiently listen to all of them and decide what to accept and what to reject. Lest we forget the virtues of Dover's powder, aconite, calomel, and sweet spirits of niter, we might take a little time out to bow our heads in grateful remembrance of the many times they have served us in the past. Are they all really so very obsolete?

A. E. H.

"THE FAMILY PHYSICIAN VANISHING IN THE CITY"

Such is the heading and editorial in an Eastern newspaper, with reference to New York City, based on a research report made by a Miss Swackhamer at the expense of the Committee on Research in Medical Economics. One of the issues involved in this work was to arrive at the relative value of the so-called *free choice*

of physicians, a slogan about which we are hearing very much today. It appears also that this Committee is very much concerned as to the apparent necessity of families being guided by outside agencies, as to the proper places to go and as to the best means of ascertaining what physicians to patronize for medical care in general. (To some of us it would hardly seem possible that in these modern years, many families are so poorly informed along these lines they must seek social and other uplift workers to lead them, psalmody-like, into pleasant lands and to suitable doctors.)

In this research Miss Swackhamer studied three hundred and sixty-five families in New York City proper, having annual incomes as follows: 32 per cent with incomes up to \$1,000.00; 49 per cent up to \$1,999.00; 14 per cent from \$2,000.00 up to \$2,999.00; 5 per cent more than \$3,000.00. "The family doctor is a vanishing ideal among two-thirds of these families, and he is very imperfectly represented among the remaining one-third." (This rather confirms the statements by general practitioners and members of some clinics, that the old-time contact and adherence of individuals and families to the individual physician and the clinics is an affair of the past, never to return.) The Committee, in concluding the report, adds the following: "The study puts the proof of the burden on those who make shibboleths of free choice and personal relationship with physician without looking to see how far these essential principles are actually effective under existing conditions of private medical practice."

While in the smaller towns the general practitioner reigns practically supreme, yet even there changed conditions and vastly improved means of transportation, with the attendant competition of the larger cities, add to the problems. In these latter places, the competition of the older organized profession sometimes induces the newer but perplexed practitioners in turn to form medical groups, and thus add to the widening list of specialists. At intervals something like the following broadside appears, even in the *Journal of the American Medical Association*, which has in the past years intimated that a large percentage of medical practice could be taken care of by the general practitioner:

"Unless the prospective mother," the speaker stated, "can be impressed with the importance of an early choice of a skillful and conscientious physician, and it is made possible for her to choose a physician from among the most competent obstetricians in the community, and unless it is made possible for those in the lower economic levels to obtain adequate medical, nursing and hospital care, a material reduction in maternal mortality rates cannot be expected."

With all due consideration for the exceeding fervor of the writer of the preceding quotation, it may also be considered, from another angle, as a decided indictment of the deans of the medical colleges and of the hospital staffs, all interested in and supposed to give excellent training to their students and to their interns, sent out into the world as general practitioners. A fairly recent graduating oration well illustrated, for the public, this

general belief that the family physician is moving out of the picture: The speaker climaxed his oratorical flight in substance as follows: "What, then will become of the general practitioner? He will be an intelligent, cultured gentleman, who will stand by the roadside; who does not practice whatsoever; but who will act as an advisor-at-large for the questioning public; and who will direct wisely and courageously all those seeking medical aid."^{*}

Another orator, completing his address, exclaimed: "Go Forward, and God Bless You." With this forceful command and with this helpful benediction, we must leave the young doctor to his Pilgrim's Progress.

A. W. S.

^{*}From *The Diplomat*.

MEAT INSPECTION

Meats were for a long time the source of much disease among human beings in various parts of the world. Dr. Mohler, Chief of the Bureau of Animal Industry, has called attention to the fact that there are seven diseases transmissible from cattle to man, namely, tuberculosis, anthrax, contagious abortion, hoof and mouth disease, rabies, cow-pox, and actinomycosis. There is also one parasite—the beef tape-worm. There are also diseases of other animals such as trichinosis which may constitute a serious problem in the human family.

The first legislation providing for meat inspection was passed by the Congress of the United States in 1890. The first phase of inspection pertained to dressed beef for export. Next came the microscopic examination of the muscle of hogs for trichina. This was so reassuring to foreign countries that Denmark, Austria, France, Italy, and Germany removed the ban which had been placed on importation of pork from America.

Before the days of Federal meat inspection, animals being taken to market for slaughter were known to have fallen on the highway and could not rise because of weakness from disease. Those found dead in cars on arrival, as well as those which had received broken bones through shipment were still sold for human food.

Today the Division of Federal Meat Inspection, under the Chiefship of Dr. E. C. Joss of the Bureau of Animal Industry, constitutes the largest service of this kind in the entire world. It employs 836 highly trained veterinarians engaged in Federal meat inspection. There are also 1,471 lay inspectors especially trained to assist in this work and twenty-one experts in chemistry, pathology, and other laboratory work.

In 1938 the carcasses of approximately 66,000,000 animals, including cattle, sheep, goats and horses, were inspected. More than 23,000 were condemned on ante-mortem examination and on postmortem examination 202,000 were condemned to the rendering tanks.

The Division of Meat Inspection also certifies meat for export and inspects meats offered for entry into the United States. For example, in 1938 more than 43,000,000 pounds from Argentina passed Federal inspection but nearly all of this was in the form of canned or cured meats. During the same year, 2,000,000 pounds of meat

from various countries was refused entry into this nation because of unsoundness, mis-labeling, defective canning, presence of prohibitive preservatives, etc.

The present cost of Federal meat inspection, which is paid by taxation, is one cent for each fifty pounds. On a per capita basis this amounts to three to four cents a person per year.

An unfortunate fact is that our Federal meat inspection applies to only two-thirds of the animals slaughtered in this country. The present laws exempt from inspection meats butchered by farmers, local butchers, and meat dealers who make only interstate shipments in serving their own customers; in other words, one-third of the meat consumed in this country is not inspected and, therefore, very bad situations may exist with reference to the slaughter of animals known to be definitely diseased, as well as those which have disease unsuspected during life. It is unfortunate that our present laws do

not provide for inspection of all meat in each state. Even animals slaughtered by farmers for family consumption should be inspected by trained veterinarians and such inspection should apply to local butchers and all who place meats on the market.

With so much that is known about the dangers of meat foods that are not properly inspected, it seems almost unbelievable that we as a people should allow one-third of all meats to be consumed in this nation without inspection. For more than fifty years the veterinarians of this country have put forth much effort to bring about the best possible arrangement for inspection of meats. Every physician can help in his community by supporting the veterinarians and encouraging the enactment of laws which will guarantee adequate inspection of all meats.

J. A. M.

Book Reviews

Failure of Circulation, by TINSLEY RANDOLPH HARRISON, M.D., associate professor of medicine, Vanderbilt University School of Medicine, Nashville, Tenn.; second edition, 502 pages, cloth; Baltimore: Williams & Wilkins Company: 1939. Price, \$4.50.

The mechanism of heart failure has always presented a problem that is confusing to the student, the clinician and the research worker. Although many phases of this important subject still remain unexplored, a great deal of precise information has been accumulated within recent years. Not a little of the clarification of this complex subject is being accomplished by the author of this most valuable volume. The first edition appeared nearly four years ago and in this second edition much new material has been added. Extensively revised are the chapters on angina pectoris, cardiac syncope and cardiac collapse. He presents in this volume the results of his own extensive researches together with those gleaned from the voluminous literature dealing with this subject. The subject matter is presented in an engrossingly interesting manner. The author has the rare ability of presenting difficult and involved concepts in simple and understandable language. He has further facilitated the clarity of the presentation by using very graphic charts, illustrations and concise resumes. The reader is actually able to visualize the devious mechanisms by which congestive heart failure takes place and to perceive how this gradually brings about the symptom-complexes of exertional dyspnea, orthopnea, nocturnal dyspnea, cardiac asthma and other allied symptoms often so distressing to the patient. Rarely does one find the pathogenesis of patients' complaints so clearly discussed. There are also many valuable suggestions as to treatment of heart failure and its symptoms.

A striking example of how the author helps visualize the pathological physiology is to be found in Chapter IX, a brief chapter of nine pages, which gives a concise statement of the dynamics of the present day accepted "back pressure" or "backward failure" theory of heart failure. He cites here a most illuminating example to illustrate how the failing heart can still provide a normal minute-volume output while the organ is becoming progressively weaker and less efficient.

The inclusion of this book in one's "must read" group will bring a great deal of pleasure and help to anyone who has frequent contact with cases of heart disease. The reviewer can recommend very highly the value of this book and the importance of its place in the library of anyone interested in the subject of heart disease.

Trauma and Internal Disease, by FRANK W. SPICER, A.B., M.D., F.A.C.P.; 593 pages, 43 illustrations; Philadelphia: J. B. Lippincott Company, 1939. Price, \$7.00.

Trauma and Internal Disease is a medical treatise which may be used as a basis for medical and legal evaluations of the etiology, pathology, or clinical processes following injury. Its writing was prompted by the medical problems which daily arise in the various courts of law relative to the causation and aggravation of disease by injury. Trauma and its relation to each bodily tissue is separately considered, and even some of the medical specialties are broken down into their subdivisions. A medicolegal viewpoint is focused on each subject.

Even though nothing new medically may be obtained by the specialist or general practitioner from this volume, a very fresh medicolegal aspect of all medical traumatic conditions is very well developed. Both the practitioner and the specialist will be able to use this volume to their advantage, especially if any of their medical problems are involved in court procedure.

Outline of Roentgen Diagnosis: An Orientation in the Basic Principles of Diagnosis by the Roentgen Method, by LEO G. RIGLER, M.D., professor of radiology, University of Minnesota, Minneapolis. Atlas edition, cloth; 212 pages with 254 illustrations shown in 227 figures, presented in drawings and reproduction of roentgenograms; price, \$6.50. Student's edition (exclusive of atlas), paper; 212 pages; price, \$3.00. Philadelphia, New York, Montreal and London: J. B. Lippincott Company, 1938.

If it is possible to master the specialty of X-ray from a single book, this book should accomplish that. If it is impossible, at least the reader can obtain a great deal of valuable information in the fields of anatomy, physiology and internal medicine. This is not only a volume on static photography but a book on the dynamics of visual diagnosis.

In the general discussion and in the summary of each chapter, the author reveals his broad and scholarly attitude towards his specialty. To him, the X-ray method of diagnosis is only one of many. He warns that it is not the only and final word in all cases—that while its value in certain diseases cannot be over emphasized—in other instances its use is limited.

The author has pointed his efforts to the selection of essentials for the general practitioner. The result is a precise, clear exposition of that part of clinical radiology which he believes the general practitioner can use in his daily work.

The work appears in two editions: one with illustrations, and the other, minus the plates but containing the same text. The plates in the complete edition are excellent. Figures 6 to 51 and 55 to 72 are drawings in an original technic by Jean E. Hirsch.

News Items

Dr. W. J. Butler, state veterinarian, was elected president of the Montana Public Health association at the annual session held in Butte, June 27, 1939.

Dr. Edward Parnall, formerly of Rochester, New York, has joined the Northwest Clinic staff of Minot, North Dakota, as an orthopedic surgeon.

The American Association for the Study of Goiter at its annual meeting recently voted to hold its convention next year in Rochester, Minnesota. Dr. Frank Rogers, Denver, was named president-elect for 1940-41.

Dr. James A. Johnson, Minneapolis, has been named president-elect of the Hennepin County medical society. He will take office in October. Other officers are Dr. Russell W. Morse, first vice-president, and Dr. William R. Jones, second vice-president. Named to elective committee posts are Dr. Ernest L. Meland and Dr. Stephen H. Baxter, executive committee; Dr. Douglas P. Head and Dr. Robert L. Wilder, board of censors, and Dr. Thomas J. Kinsella and Dr. Martin Nordland, ethics committee.

Six Montana counties have been re-accredited as modified cattle tuberculosis-free areas. Dr. G. W. Cronen, inspector in charge of the Montana office of the U. S. Bureau of Animal Industry, announced counties re-accredited for a three-year period effective June 1 included Deer Lodge, Granite, Liberty, Ravalli, Sheridan and Toole.

Dr. Milo H. Larson, formerly of Nicollet, Minnesota, is now practicing in Mankato.

Dr. L. F. Leitschuh, a graduate of the University of Minnesota Medical School, 1937, has become associated with Dr. J. A. Malerich at Shakopee hospital, Minnesota.

Dr. John C. Mickelson, graduate of the University of Minnesota Medical School who interned at Jersey City Medical Center the past year, has joined the staff of the Mankato, Minnesota, clinic as general practitioner and obstetrician.

Dr. Theodore P. Mollers of Cloquet is now practicing in Mazeppa, Minnesota.

Dr. Horace Newhart, Minneapolis, was elected president of the American Otological society at its seventy-second annual meeting at Rye, New York. This is the oldest society of its kind in the world.

Dr. John G. Lamont, Minneapolis, has been appointed superintendent of the Grafton, North Dakota, State School for the Feeble Minded by the North Dakota board of administration. Dr. Lamont headed the state tuberculosis sanatorium at Dunseith for 16 years. He resigned in 1929 to join the staff of Nopeming hospital and in 1935 came to Minneapolis to do clinical work. He succeeds Dr. Frank Deason who resigned, at Grafton.

At the meeting of the Great Northern Railway Surgeons' Association held in Glacier Park, July 1, 1939, the following officers were elected: Dr. D. S. MacKenzie, Sr., Havre, Montana, president; Dr. W. L. Kell, Columbia Falls, Montana, first vice-president; Dr. H. E. Cleveland, Burlington, Washington, second vice-president; Dr. A. C. Baker, Fergus Falls, Minnesota, third vice-president; Dr. R. C. Webb, Minneapolis, secretary-treasurer.

The cornerstone of the new \$325,000 St. John's hospital at Helena, Montana, was laid June 24, 1939.

Dr. Donald L. Peterson who has held a surgical fellowship for the past four years at the Mayo clinic, Rochester, has become associated with Dr. W. G. Brown of Fargo, North Dakota.

The indictment charging the American Medical Association and 21 prominent physicians with violating the anti-trust laws, was dismissed in federal court July 26. Justice James M. Proctor ruled that medicine is not a trade, but a learned profession, and therefore that the defendants could not be guilty of restraint of trade in their alleged activities against Group Health Association, Inc., a coöperative set-up to afford medical care on a pre-paid basis to federal employees in the District of Columbia.

Dr. F. J. Fischer of St. Paul is now associated with Dr. A. K. Stratte in Pine City, Minnesota.

The University of Minnesota Medical School will observe its fiftieth anniversary with a three day celebration, October 12, 13 and 14. Outstanding men of medical science will come to Minnesota to take part in the activities, some festive, some serious. Dr. Harold S. Diehl, dean of the medical school, and Dr. Owen H. Wangensteen, chairman of the celebration committee, head the list of University faculty making preparations for the event.

Dr. Thor Moeller, Munich, North Dakota, has moved to Maddock where he has taken over the practice of his brother, the late Dr. J. H. Moeller.

Dr. C. E. Waldorf, Redfield, South Dakota, has been elected Spink county physician.

The School of Medical Sciences at the University of South Dakota, Vermillion, was approved by the Council on Medical Education and Hospitals of the American Medical Association at the meeting held in St. Louis, according to Dr. J. C. Ohlmacher, dean of the school.

Dr. Ira D. Clark, Sr., Fargo, North Dakota, has moved to Milnor. Dr. Ira D. Clark, Jr., also of Fargo, has become associated with Dr. H. W. Miller in Casselton.

Dr. James D. Morrison has joined his father, Dr. W. R. Morrison in Billings, Montana, and will limit his practice to diseases of the eye, ear, nose and throat. A graduate of the medical school of Washington University, the younger Dr. Morrison for the last two years has been resident eye surgeon in the Colorado General and University hospitals in Denver.

A permanent organization of the Rice County Chapter of the National Foundation for Infantile Paralysis was formed at a meeting recently in Faribault, Minnesota. Plans are now being made to carry out the program of the national organization within the county. Fifty per cent of the funds raised last January at the President's Birthday balls in Northfield and Faribault has been retained by the local chapter and the money will be available to assist infantile paralysis victims.

Necrology

LOUIS H. FLIGMAN, M.D. 1878-1939

Dr. Louis H. Fligman of Helena, Montana, passed away July 14, 1939. He was graduated from the University of Minnesota Medical School in 1901, and opened his office in Helena in 1902. He was one of the first physicians of that state to limit his practice to internal medicine. Dr. Fligman possessed a natural ability in his chosen field which he enhanced by frequent attendance in clinics both in the United States and abroad.

During the World War he was a Lieutenant Commander in the Naval Reserve Corps. He was a past president of the Medical Association of Montana and of the State Board of Health. At the time of his death, he was the Montana Governor of the American College of Physicians.

Dr. Fligman was a man who made a favorable impression on all who knew him and his manner inspired confidence. His many friends will feel his loss both personally and professionally.

J. B.

Dr. George A. Clauser, 74, Bridgewater, South Dakota, pioneer McCook county physician, died at his home June 27, 1939.

Dr. H. M. Finnerud, 80, one of the first physicians of Watertown, South Dakota, died July 10, 1939. He had taken an active part in many civic and private enterprises during his 49 years of residence in Watertown.

Dr. George McGrath, 73, pioneer physician of Hamilton, Montana, died June 21, 1939. A graduate of Queen's university, Toronto, Ontario, Dr. McGrath came to Hamilton in 1893.

Dr. James Alfred Watson, 71, of Minneapolis, Minnesota, died June 17, 1939. He had practiced in Minneapolis for 39 years and was a past president of the Minnesota Academy of Ophthalmology and Otolaryngology.

Dr. Eugene Silas Strout, 76, of Minneapolis, Minnesota, died June 25, 1939. Dr. Strout was a graduate of the University of Michigan and had lived in Minneapolis 45 years.

Dr. Elmer C. Hanson, 42, of Austin, Minnesota, died June 23, 1939.

Minnesota State Board of Medical Examiners

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DOCKET OF CASES

Jury Disagrees in Trial of Minneapolis Chiropractor

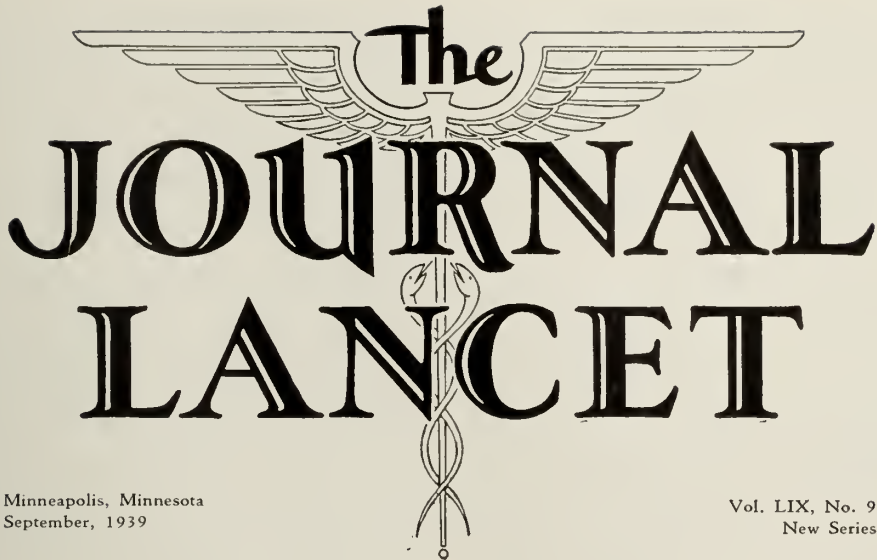
Re: STATE OF MINNESOTA vs. ARTHUR J. KOLLING

After deliberating more than 26 hours, a jury of nine women and three men, in the court of Judge Lars O. Rue of the Hennepin County district court, reported that it was unable to reach a verdict on the guilt or innocence of the defendant, Arthur J. Kolling, a Minneapolis chiropractor being tried on an indictment in which he was charged with practicing medicine without a license. The case was given to the jury at 3:30 o'clock p. m. on June 20, 1939, and at 6 o'clock p. m. the next day the jury was discharged by Judge Rue. It is reported that the jury was deadlocked 6 to 6. The case will be re-tried at the September term of Court.

The defendant, who is licensed to practice chiropractic in Minnesota and who owns the Hennepin Clinic at 805 La Salle Avenue, Minneapolis, was indicted by the Grand Jury on May 16, 1939, on a charge of practicing medicine without a license. The state introduced evidence at the trial that Kolling had sutured a wound of a 10 year old boy with surgical catgut. The boy had been injured by an automobile at 8th and La Salle and removed to the office of the defendant by the office assistant of the defendant. The accident happened at 4:15 o'clock p. m. on April 14, 1939. Despite the fact that the ambulance was called and that the accident occurred within one block of the Medical Arts Building, at a time when hundreds of medical men were available the case was described by counsel for the defendant as an "emergency". The parents of the boy called their family physician who promptly removed the boy to the hospital. On April 28th a statement for "services rendered" in the amount of \$25.00 was sent on the stationery of the Hennepin Clinic.

Kolling did not take the witness stand in his own behalf but introduced testimony that the \$25.00 charge was made to cover the damage done to his office and his equipment by the boy becoming nauseated, which he estimated at \$10.00 and the balance of \$15.00 to go to W. D. Hammond, M.D., for services. Dr. Hammond is registered with the Medical Board from 106 Washington Avenue South, which is the location of the Health Institute, specializing in "diseases of men." Dr. Hammond testified for the state and denied the boy was his patient and stated that the suturing was done by the defendant with catgut and surgical instruments owned by the defendant. Dr. Hammond's name appeared on the door of the Hennepin Clinic on that date but he testified that he had no arrangement with the defendant but was considering purchasing the place from Kolling. It also developed that the office assistant of the defendant is the wife of Dr. Hammond. Mrs. Hammond also testified for the state and stated that she was paid \$5.00 per week for her services at the Hennepin Clinic.

Kolling was fined \$150.00 in 1928 in the district court of Hennepin county following his plea of guilty to a charge of practicing medicine. He was also fined \$2,000.00 in 1938 in United States District court following his plea of guilty to a charge of violating the internal revenue laws of the United States in connection with the alleged diversion of industrial alcohol. Kolling paid the fine and is on probation for three years on a suspended sentence of two years in prison in the same case.



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Sixty-First Annual Session

Butte, Montana

June 28 — July 1, 1939

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MINUTES OF COUNCIL AND HOUSE OF DELEGATES MEETINGS

Held at Finlen Hotel

The Council Meeting, held on June 28, 1939, at the Finlen Hotel, Butte, Montana, at 4:30 P. M., at the annual session of the Montana State Medical Association, was opened by the President, Dr. J. C. MacGregor.

After the Secretary had ascertained a quorum was present, the meeting was open for business.

The minutes of the last Council Meeting were read and approved as read.

The Secretary presented the financial report of the Treasury and indicated in his report that it would be necessary to raise the dues to at least \$8.00 in order to prevent the use of invested funds of the Association. After a thorough discussion of the subject, Dr. J. H. Garberson made a motion, which was seconded by Dr. M. B. Hesdorffer, that the Council recommend that the dues be raised to \$8.00 per annum.

The next business to come before the Council was that of an official journal for the Association. Dr. Stewart, a member of the Editorial Board of the JOURNAL-LANCET, talked on the JOURNAL-LANCET and presented the various activities. He outlined the structure of the JOURNAL-LANCET Editorial Board and the policy, including the active participation of the Montana State Medical Association in the future activities.

The Secretary informed the Council that it would be necessary for them to nominate and appoint an attorney for the ensuing year. Dr. P. E. Kane made a motion which was seconded by Dr. H. W. Gregg that Mr. E. G. Toomey be retained for the year at the same salary of \$300.00 a year.

There being no further business the Council adjourned subject to the call of the President.

The Council Meeting, held on June 29, 1939, at the Finlen Hotel, Butte, Montana, at 5 P. M., was called to order by the President, Dr. J. C. MacGregor, and a quorum being present the meeting was open for business.

The President discussed the organization known as the "Pacific Medical Executives" and stated that the purpose of the organization was a closer relationship between the various State Associations in dealing with Federal families on relief, medical-legal defense, malpractice insurance and other medico-economic subjects. After a thorough discussion of the matter, a motion was made, seconded, and passed that Montana enter into such an Association.

The President appointed an auditing committee of Drs. J. H. Garberson, P. E. Kane, and L. T. Sussex, to audit the report of the Secretary-Treasurer. The Committee reported favorably and moved that the report of the Secretary-Treasurer be accepted.

Dr. Garberson spoke at length on the annual registration and the necessity of amending the Medical Practice Act. After discussing the matter, a motion was made, seconded, and passed that the Executive Committee, with other members, be empowered to devise an annual registration fee law and to suggest such necessary amendments of the Medical Practice Act.

There being no further business the meeting of the Council adjourned subject to the call of the President.

The House of Delegates of the Montana State Medical Association was called to order by the President, Dr. J. C. MacGregor, at the Finlen Hotel, Butte, Montana, on June 30, 1939, at 9:00 P. M.

The credentials of the various delegates were examined by the Secretary and found to be in order.

A quorum being present, the meeting was open for business.

The minutes of the last meeting were read and accepted as read.

The President appointed a Resolution Committee, consisting of Drs. T. J. B. Shanley, Chairman, S. A. Cooney, and L. L. Maillet, with the request that they report on July 1, 1939.

A Necrology Committee, consisting of Drs. J. K. Coleman and Thos. F. Walker was appointed by the President, with the request to report on July 1, 1939.

The report of the Secretary-Treasurer was read and adopted as read.

The report of Dr. J. H. Irwin, official delegate of the Montana State Medical Association to the American Medical Association Meeting, was read and accepted as read.

Dr. S. A. Cooney reported on the Legislative Committee and Dr. J. H. Garberson opened a discussion on the necessity for revising the Medical Practice Act. A motion was made, seconded, and passed that a Committee be appointed to work with the Executive Committee to submit recommendations for the revision of the Medical Practice Act and an annual registration fee to be approved by the County Societies and to be acted upon by the House of Delegates at the next annual meeting.

Dr. Frank McPhail, Chairman of the Maternal and Infant Welfare Committee, reported at length. (It is the opinion of the Secretary that this report should be printed and sent to all members of the Association.) A motion was made, seconded, and passed that the report be adopted. The report in detail submitted the following proposals for the approval of the House of Delegates: First, that the House of Delegates approve a study of hospital births and cooperate with a Committee appointed from the Montana Hospital Association; Second, a survey of all births in Montana; Third, the approval of the new birth certificate as recommended by the American Committee on Maternal Welfare; Fourth, that the House of Delegates approve of occasional state-wide conferences on maternal and infant care; these conferences to be put on by

physicians and hospital authorities, public health nurses, and lay organizations interested in this phase of public health; and Fifth, the approval of a more complete use of the public health nurse. (For details see Committee Report.)

A proposal was made to amend Section 1, Chapter 4, of the By-Laws to read as follows: "The House of Delegates shall meet during the Annual Session of the Association and at such other times as necessity may require, subject to the call of a majority of the Executive Committee or on petition of ten delegates, representing at least three component medical societies." Final action on this proposal to be taken on July 1, 1939.

Dr. Tom Moore, Delegate from Flathead Medical Society informed the House of Delegates that he had been instructed by his Society to request the re-adoption of Sectional Post-graduate Meetings. It was brought out in his suggestion that the speakers available through the State Board of Health be under the jurisdiction of the Committee on Maternal and Infant Welfare and that these meetings be entirely under the jurisdiction of the local county medical society and the Committee on Maternal and Infant Welfare.

A motion was made, seconded and passed that the Executive Committee be empowered to deal with the JOURNAL-LANCET to contract for an official publishing organ for the Association.

Dr. R. F. Peterson reported as Chairman of the Cancer Committee. A motion was made, seconded, and passed that the report be adopted.

Dr. J. K. Coleman made the report for the Orthopedic Committee. In making the report six proposals were presented to the House of Delegates for their consideration. These proposals were in response to a questionnaire sent to the members of the Committee by the Secretary; the first question being "Do you believe an internist or pediatrician should be available for the care of orthopedic patients while in the orthopedic center?" The Orthopedic Committee suggested that such a person be made available by his appointment and the limits of his service be kept at the discretion of the orthopedic surgeon himself. The House of Delegates did not concur on this opinion. The second question was "Do you believe that this consultant should be selected by the orthopedic surgeon; if not, how should he be selected?" There being no vote by the House of Delegates on this question, the proposal was not accepted. The third question was "How should the consultant be remunerated, by the case, or by the visit?" There being no vote on this proposal, the House of Delegates did not concur. The fourth question was "In cases requiring the attention of the physician following the return home of a patient, would it be practicable to instruct the family physician as to the type of service required and for him to present his bill for services to the orthopedic surgeon, who would endorse and present it to the orthopedic office for payment?" The Orthopedic Committee recommended that this policy be adopted and the House of Delegates concurred in their action. The fifth question was "In the event of the development of a non-orthopedic condition in the patient while under orthopedic care, should the family physician be compensated for his services by the Welfare Board?" The Orthopedic Committee recommended that the family physician should be compensated for by the State Department provided the complication is related to the orthopedic problem. All dissociated illnesses should be handled as they would have been handled if the cases had not been once under orthopedic care. The House of Delegates concurred in this decision. The sixth question was "It has been implied that a Medical Advisory Committee to the Orthopedic Division of the Welfare Board would be welcomed. Do you believe this committee should be composed of only physicians, not designated as orthopedic surgeons?" The Orthopedic Committee recommended that there should be a committee of at least three, one of whom should be an orthopedic surgeon. The House of Delegates did not concur in their recommendation. A motion was made, seconded, and passed that a Medical Advisory Committee be appointed but that no member of the Advisory Committee be physicians who in any manner would themselves or their business associates be eligible for participation in the medical or surgical activities of the Welfare Commission or

receiving any fees whatsoever for services from the Welfare Commission.

Dr. Thos. F. Walker reported on the Historical Committee. A motion was made, seconded, and passed that the report be adopted and that \$500.00 be advanced to L. L. Callaway for continuation of work.

The Secretary was instructed to write messages extending greetings to Dr. John A. Donovan and Dr. J. A. Evert, absent from the meeting because of illness.

There being no further business, the House of Delegates adjourned subject to the call of the President.

The House of Delegates was called to order at 1:45 P. M. at the Finlen Hotel on June 30, 1939, by the President, Dr. J. C. MacGregor.

Dr. Harold Gregg, Chairman of the Medical Defense Council, reported for the Committee. A motion was made, seconded, and passed that the Committee report be accepted.

A motion was made, seconded, and passed that the annual dues be raised from \$5.00 to \$8.00 per annum.

A motion was made, seconded, and passed that the Montana State Medical Association affiliate themselves with the Pacific Medical Executives.

At this time, Mr. Stasel of Minneapolis was introduced to the House of Delegates and spoke on "hospitalization."

Dr. F. I. Terrill reported as Chairman of the Tuberculosis Committee and suggested that a Tuberculosis Committee be appointed in each local society. He also spoke at length of the Housing conditions at Galen and the general status of the Tuberculosis State Sanitarium. A motion was made, seconded, and passed that the report be adopted.

A letter was read to the House of Delegates suggesting that a Committee be appointed to draw up resolutions to work for a tuberculosis hospital for the Indians at Billings, Montana. The motion was made, seconded, and passed that the committee be appointed to draw up such resolution.

A report of the legislative Committee was made by Dr. S. A. Cooney. He stated that no legislation had been passed that was detrimental, except to the hospitals, at the last Legislative Session. He opposed the Secretary putting in bills over the head of the Legislative Committee. He recommended the increase of the salaries of the assistants at state institutions.

The Economics Committee made their report through their Chairman, Dr. J. C. Shields. Dr. Shields moved the adoption of the Committee report which was seconded and passed. The Economics Committee reported on what should be the minimum standards for the care of families under the Farm Security Administration. A motion was made, seconded, and passed adopting this report. (For details see Committee report.)

There being no further business, the House of Delegates adjourned subject to the call of the president.

The House of Delegates were called to order on July 1, 1939, at the Finlen Hotel, Butte, Montana, at 9:00 A. M., by the President, Dr. J. C. MacGregor.

A quorum being present, the meeting was open for business.

It was moved, seconded, and passed that the State Association send a resolution to the President and Secretary of War, requesting the appropriation of sufficient funds for the erection of a Medical Library Building in Washington, D. C.

A motion was made, seconded, and passed that the By-Laws be amended in Section 1, Chapter 4, to read as follows: "The House of Delegates shall meet during the Annual Session of the Association and at such other times as necessity may require, subject to the call of a majority of the Executive Committee or on petition of ten delegates, representing at least three component medical societies."

The Executive Committee, in conference with Mr. L. M. Cohen, representative of the JOURNAL-LANCET, agreed that the JOURNAL-LANCET would supply the membership with the publication for a period of three years at a rate of \$1.75 per copy.

The place of the meeting in 1940 was discussed and left to the decision of the Executive Committee. An invitation was extended to the Association by the Delegates of Gallatin County Medical Society to meet in Bozeman.

A motion was made, seconded, and passed that the Farm Security Administration deal primarily and first with the State Association in any agreement with Local Societies. It was moved, seconded, and passed that the Economics Committee be empowered to confer with the Farm Security Administration on a Master Plan for the care of families under the jurisdiction of the Farm Security Administration.

A letter was read from Dr. Woodward urging that telegrams be sent opposing the amendment to the Wagner Act. A motion was made, seconded, and passed that the opposition of the House of Delegates to this amendment be sent to the Chairman of the Finance Committee.

It was moved, seconded, and passed that the Executive Committee submit a list of names for appointment to the State Board of Health.

A vote of appreciation was extended to Dr. J. C. MacGregor and Dr. T. L. Hawkins for their work during the last year.

Dr. J. H. Garberson nominated Dr. J. I. Wernham of Billings as President-Elect. The nomination was seconded. A ballot vote cast for Dr. J. K. Wernham. The canvas of the ballot showed that Dr. J. I. Wernham had been unanimously elected as President-Elect.

Dr. R. H. Dyer was nominated by Dr. F. F. Atix as Vice-President. The nomination was seconded. A canvas of the ballots showed Dr. Dyer to be elected unanimously as Vice-President.

Dr. Thos. F. Walker was nominated for Secretary-Treasurer by Dr. Herbert Caraway. The nomination was seconded and ballot vote cast for Dr. Walker. A canvas of the ballot showed Dr. Walker was elected unanimously as Secretary-Treasurer.

There being no further business the meeting was adjourned.

THOMAS L. HAWKINS, M.D.,
Secretary.

REPORT OF DELEGATE TO AMERICAN MEDICAL ASSOCIATION 1939 MEETING, J. H. IRWIN, M.D.

The outstanding event at the meetings of the House of Delegates at the American Medical Association convention at St. Louis this May, was without doubt the consideration, final report and adoption of same, without a dissenting vote by the House of Delegates, of the Wagner Bill. I presume you have read this report as published in the press or in the *Journal of the American Medical Association* and that it would be wasting your and my time to go into it in detail. However, I wish to stress a few of the most important features of it.

The Wagner Bill was considered so important that a Special Committee was appointed to consider it and all matters related thereto, that might be presented to the House for consideration. The committee was composed of some of the ablest men in the House and I can assure you they worked long and arduously in the consideration of same. In fact, there was about twenty hours of open committee meetings to which all interested were invited and urged to attend and present their ideas and many more hours that the committee spent in drawing up their report. Most of you have undoubtedly read the report which was published not only in the *Journal* but in many other medical magazines and daily papers, so I will stress only a few of the most important points.

Resolutions were presented by Iowa and Texas condemning the bill. In the opening statement of analysis of the Wagner Bill, the committee states "although (page 2295) One resolution requesting special representations of women physicians by a special delegate and another requesting special delegate to represent the negro physician were presented and both were disposed of in substantially the same way, that is, women physicians and negro physicians when admitted to the County Medical Society, automatically become members of the State Society and there may be elected to a seat in the House of Delegates." The committee could see no reason to change this procedure.

Immediately after organization, the House of Delegates submitted names of three men, one of whom was to be chosen by ballot for the distinguished service award. Dr. James B. Herrick was elected to receive this honor. This gave me personal gratification as Dr. Herrick was professor of medicine

when I was a medical student at Rush and attending physician at Presbyterian Hospital during my internship there.

Following this were addresses by speakers of the House of Delegates, President, and President-Elect. Both gave a very interesting review of acts of the House of Delegates for a period of years past. President I. Abell reviewed developments of the past year, particularly with reference to the meeting with Interdepartmental Committee and the President of the U. S. (Quote page 2171.)

President-elect Rock Sleyster called attention to other medical organizations than the American Medical Association organized purely for scientific purposes, at times assuming to speak on matters of policy and principles affecting the medical profession, certainly a right any individual doctor has as an individual but not as a right to speak for the profession as a whole. Dr. Sleyster further pointed out the commendable work done by the various councils: the cleaning up of advertising pages of medical journals, the improvement of standards of medical schools and hospitals. (Quote page 2162.)

These addresses are all published in the *Journal of the American Medical Association* of May 27 and should be read by all. The report of the Council on Medical Education and Hospital is quite lengthy and should be carefully studied. It is reported in full in the *Journal*. The report of the Committee of Medical care by Dr. Brasch shows result of survey being made by the American Medical Association. I quote page 2177.

Dr. Nathan B. Van Etten of New York was elected president-elect, Dr. Alphonse McMahon of St. Louis, vice-president; Dr. Olin West, secretary and manager. Dr. Herman L. Ketschmer was re-elected treasurer.

REPORT OF COMMITTEE ON MATERNAL AND CHILD HEALTH

To the House of Delegates in meeting at Butte, June 30, 1939, the Committee on Maternal and Child Health begs to submit the following report.

Since public interest has been aroused by our national maternal and infant mortality rates there has been an increasing interest in this subject. Many articles have appeared in the lay press which have been erroneous due to misinformation. However, the aroused public interest has called to the attention of the medical profession matters which should have been studied long ago. In recent years many mortality studies have been made in different parts of the United States. From these studies we find that the responsibility for the health of our mothers and children must be divided between the individual, the community, and the medical profession. During the past two years this Committee on Maternal and Child Health has made a study of the maternal deaths in Montana. In order to understand more completely the conditions influencing maternal and infant mortality, much more information is necessary. For example, we have a considerable Indian population in this state and statistical information should be collected so that the rates among the Indians could be segregated from the rest of the State.

During the past five years there has been a definite reduction in both infant and maternal mortality in Montana. During that time a full time division of maternal and child health was added to our Public Health organization. This department was organized by Dr. Jessie Bierman and since she left, the work has been continued by Dr. Edythe Hershey. Two years ago the present Committee on Maternal and Child Health was appointed by the President of the State Medical Association. This Committee has served in an advisory capacity to the Maternal and Child Health division of the State Board of Health. All maternal deaths have been investigated. However, as the number of deaths is too small to be of statistical value, no report will be made of this study.

The following graphs and tables have been prepared to portray our maternal and infant mortality during the recent years. It is impossible to draw conclusions as to cause of death from these statistics. Further studies are necessary, particularly in regard to live births. It is hardly fair to judge our work solely from the bad results.

Figure 1. The graphs show the infant mortality rate for each one thousand births for the years 1922 to 1937. It will be noted that the rate in Montana is not consistently below that of the United States. The provisional rate for 1938 is 45.2. This is a marked improvement. However, unless this improvement is maintained in 1939, it will not be of great importance.

Figure 2. This graph is included to point out the great loss of life resulting from still-births. While still-births are not included in the infant mortality rates, they represent loss in life. Undoubtedly all still-births are not reported but the still-birth rate remains almost constant.

Figure 3. The age distributions of infants for a ten year period is shown. It will be noted that there has been very little change in the percentage of deaths occurring in the first day and first week of life. Further study indicates that prematurity and birth injury are the important factors causing death. More information must be gathered before suggestions can be made to influence this important cause of death.

Figure 4. This graph shows the maternal mortality rate in Montana as compared with the rate in the United States for the years 1922 to 1937. The rate for the last five years has been consistently below that of the United States. Our maternal mortality study indicates that maternal deaths can be reduced considerably by improving antepartum care and by learning better methods for the care of infections, toxemias, hemorrhages and abortions.

Figure 5. This graph represents the total maternal deaths for each year according to the chief cause of death. It will be noted that in 1937 there were only six deaths from puerperal sepsis as compared with sixteen in 1933. There has been little change in the number of deaths from toxemia or hemorrhage. We may reduce our maternal mortality still more by more active treatment of the toxemias and hemorrhages. Transfusion should be employed regularly and preparation to transfuse should be made on the slightest provocation. The public should be informed of the danger of abortion.

Figure 6. On these maps the infant and maternal mortality is shown for a five-year period. Twenty-seven counties have had fewer than 500 births in the five-year period. The mortality rates in these counties are of no great significance as just one or two deaths will cause great variation in the rates. The counties on the map are shaded to indicate those having mortality rates higher, lower, and the same as the county rate.

Figure 7. Seventeen counties had more than one thousand births in the five years 1933 to 1937. As almost 70 per cent of the births occur in these counties their mortality rate will influence the mortality rate for the State. The average record for each of these counties, whether lower or higher than the state average in both maternal and infant mortality is shown. White squares indicate a rate lower, black squares a rate higher, and shaded squares a rate the same as the state rate. There are still many preventable deaths. If each county were to make a thorough study of conditions, our mortality rates could be lowered considerably.

FUTURE PLAN

In the study of maternal deaths sixteen of the thirty-six physicians replying to the questionnaires sent out by the Committee on Maternal and Child Health, added a note stating that they felt that the death in question could have been prevented had the patient received proper antepartum care. If this is correct, our maternal mortality rate for 1938 could have been 21 instead of the provisional rate of 36 per 10,000 live births.

The Committee on Maternal and Child Health is anxious to make more complete studies of cause of death in both mothers and children. For this we need the cooperation of the entire medical profession. It is for this reason that we wish to present the following proposals to the House of Delegates. We urgently request that these proposals be considered at this time.

The State of Montana occupies an enviable place among the other states of the Union. At the present time we are seventh in maternal mortality and tied for twenty-second in infant mortality. There is a great improvement taking place among other states, and if we wish to hold our standing we

also must improve. The Committee plans to continue a study of all maternal deaths, but if we are to accomplish much this study must be broadened. Specific recommendations cannot be made until we know more about the cause of death. The Committee therefore presents the following proposals for your approval:

1. *The Montana Hospital Obstetric Association.* The Montana Hospital Association has appointed a committee to study all hospital births. This will be in the form of a statistical study accumulating records from all hospital births. This study should be perpetual. If the Medical Association approved this study it may be started at once.

2. *A Survey of all births in Montana.* A study of maternal deaths and hospital births, while valuable, leaves much to be learned in regard to the large number of births which occur in the home. If we are to do much to lower the loss of life from prematurity and still-births, we must know more about the conditions affecting these births. Many questions in regard to the economic status, hospitalization, availability of medical care, (particularly true in regard to the osteopath problem) cannot be answered today. The Committee recommends a one-year study of all births in the State. As we have over 10,000 births each year, this will be of great statistical value.

3. The Committee recommends the approval of the new birth certificate recommended by the American Committee on Maternal Welfare.

4. The Committee recommends that the Medical Association reconsider the subject of Refresher Courses. We feel the Refresher Courses on maternal and infant problems should be under the direction of this Committee, and should be given only if requested. Speakers may be obtained from within the State or from the outside as requested. Cooperation of the State Board of Health is desirable.

5. The Committee recommends that the Medical Association approve the idea of an occasional state-wide conference on maternal and infant care. These conferences would be in the form of the joint conference between physicians, hospital authorities, Public Health nurses, and lay organizations interested in this phase of Public Health. A better relationship between the medical profession and the laity is desirable.

6. The Committee recommends the more complete use of the Public Health nurse. It is neither the desire of, nor is it possible for the Public Health Department to practice medicine. It is possible to use the Public Health Nurses' Association to advantage, by having the nurse work under the physician's direction. Antepartum care could be greatly improved, thus having an effect on reducing maternal mortality. Postpartum follow-up would play an equally important role in reducing infant mortality.

7. The Committee urges that the Medical Association continue the study of a proposed radio program discussed at the meeting last year. A better understanding on the part of the laity would be possible. Many people are inclined to look upon the medical profession as obstructionists. A clearer understanding between the laity and the physician would make it possible to practice more preventive medicine. It is in this improved relationship that we have hope of reducing our maternal and infant mortality.

FRANK MCPHAIL, M.D.,
Chairman.

REPORT OF CANCER COMMITTEE

The Cancer Committee of 1938-1939 reports to the House of Delegates of the Montana Medical Society as follows:

1. Most of the work of the year has been done in conjunction with the American Society for Control of Cancer and the Women's Field Army.

2. Each member of the Committee has acted in the capacity of advisor to these organizations in his respective district.

3. The Committee Chairman, who is thereby Chairman of the Executive Committee of the Montana Women's Field Army, has worked with that organization in planning and advising for education of the public about cancer—in short, that early cancer is curable. He must also approve budgets and payments of all bills of this organization, which spent over \$1500 in the past year's campaign.

4. It sent material for talks on cancer to all doctors requesting such material.

5. It planned to make a survey of the deaths from cancer in Montana last year, but complete records of patient's name, doctor's name, and address will not be available for 1938. However, they are being filed for 1939, and if the association thinks it advisable, the plan will be carried out next year.

6. In 1910 there were 157 deaths from cancer in Montana, which number had increased to 583 in 1937, and decreased to 548 last year. We hope that by continued education of the public, this decrease in cancer mortality will continue.

R. F. PETERSON, M.D.

REPORT OF COMMITTEE ON ORTHOPEDICS

Our State Legislature in 1937 created a State Department of Public Welfare and established within that Department, a Division for Service to Crippled Children. Previous to that date and since 1921, services, such as the State was able to offer through inadequate funds, were under the direction of the Montana Orthopedic Commission.

The Division of Crippled Children came under the State Department of Public Welfare on July 1st, 1937. The Division of Crippled Children maintains its central offices in the Public Welfare Building in Helena, Montana, and functions with a full-time staff of three technically trained orthopedic nurses, Miss Freda E. Miller, Director of the Department, Miss Mabel F. Johnson, and Miss Estelle H. Kezer. Five orthopedic surgeons, L. W. Allard, M.D., Billings, Montana; J. K. Coleman, M.D., Butte, Montana; E. M. Porter, M.D., Great Falls, Montana; E. S. Porter, M.D., Lewistown, Montana, and J. R. Vasko, M.D., Great Falls, Montana, serve on a part-time basis. The orthopedic surgeons are remunerated for their work according to an established fee schedule. They receive a per diem and expenses while conducting diagnostic clinics at several population centers throughout the State. Care for crippled children in each of these districts is assigned to an orthopedic surgeon.

The surgeons were appointed on the recommendations of the State Medical Society. Three of these surgeons have been certified by the American Board of Orthopedic Surgery. The other two will qualify by training and experience. They, because of established general practices, can not economically limit themselves to orthopedic work. However, their long years of unselfish service entitles them to retain their position with the Crippled Children Division.

The following hospitals: The Columbus Hospital, Great Falls, Montana; The Deaconess Hospital, Great Falls, Montana; The Murray Hospital, Butte, Montana; Shodair Hospital, Helena, Montana; St. Joseph's Hospital, Lewistown, Montana, and St. Vincent's Hospital, have been approved to take care of State cases. Any hospital, before being approved, must show that it is adequately equipped and properly personneled for this particular type of work.

Under the provisions of the Crippled Children Division of the Welfare Department, any resident of the State under 21 years of age, who has a remediable orthopedic defect the care of which they can not themselves finance, is qualified to receive financial help in the treatment of the defect.

The Division extends its assistance to cover the surgeon's fee according to the fee schedule, hospitalization, braces, appliances, artificial limbs, etc. The Division also maintains a follow-up service, this service practically paying for itself by the saving in hospital care through earlier dismissal. The same service also seeks out through the family physician and public health nurses cases that should be examined and advised because of neglected defects.

To simplify the problem throughout the State, prospective cases and those that have been discharged at an earlier date are brought to the diagnostic centers, mentioned earlier in this report. Between March 1st, 1937, and March 1st, 1938, 729 children were examined at these clinics; 220 of these were hospitalized for a total number of 10,292 days. During this same period 982 home calls were made by the public health nurses and 65 cases were referred to the Bureau of Vocational Rehabilitation.

Between July 1st, 1937, and March 1st, 1938, \$46,347.18 was expended on the care of the crippled children. This cost

was divided equally between State and Federal funds. It is interesting to note that the State office personnel cost was \$4,280.00; the field personnel was \$840.00, to which should be added travel and subsistence costs of \$1,153.68 for the office personnel and \$571.95 for field personnel. \$23,780.71 was paid for hospital care, the surgeons receiving \$10,339.42 for their fees and services during this period, to which should be added \$2,825.00 for convalescent care and \$139.40 for travel. Other expenditures, such as stationery, office supplies, telephone and telegraph, appliances, etc., make up the balance of the total expenditure. These figures were taken from page 92 of the March 1st, 1938, report to the Governor.

We have had to use these figures as an example of the expenditures of the Crippled Children Division because of the fact that the 1939 report will not be available until early in July. The 1939 report will probably be in like proportion.

It is to be noted that the administrative costs for the past two years amount to only 8.9 per cent, the balance of the appropriated funds being spent for services.

The 1937 legislature appropriated \$37,000.00 for services to crippled children while the 1939 legislature appropriated \$40,000.00 per annum, this sum being matched to federal funds.

The average cost per case treated in the hospital during 1937 was \$248.85. As the fees and per diem costs have not been materially altered, approximately the same cost per case likely will prevail now.

The Division estimates Montana has approximately 3,200 cases under 21 years of age, these cases being orthopedic. Your committee would estimate this figure to be a little low. Nearly 2,000 of these cases have been examined and diagnosed.

Numerous problems have naturally presented themselves throughout the years. These problems usually are satisfactorily solved at conferences with the Department officials. Several of these problems, however, demand more adequate solution.

On April 27th, the Secretary of the State Medical Society sent out a questionnaire to the members of your committee, presenting several queries which your committee now enumerates with its recommendations:

1. Do you believe an internist or pediatrician should be available for the care of orthopedic patients while in the orthopedic center?

Answer: The direct answer to this question is "yes"; however, the orthopedic surgeon should be in a position to handle most of the incidental medical and surgical problems that accompany the case under his care. This has been done in the past and will be continued into the future. Extraordinary cases do present themselves when it is advisable to call in a specialist from some other field. This also has been done without added cost to the crippled children fund, but there does remain the few isolated cases where the consultant performs a very major service and should be compensated in some way for this help. Some provision should be made by the State Department to take care of this problem within definite limitations.

2. Do you believe that this consultant should be selected by the orthopedic surgeon—if not, how should he be selected?

Answer: The orthopedic surgeon should call in the consultant he feels most confident to assist him with the diagnosis or care of the case.

3. How should the consultant be remunerated, by the case, or by the visit?

Answer: This is a difficult question to answer unless the State Department can provide an acceptable fee schedule for consultation that would cover most of the consultation problems that arise. Otherwise, there will need to be a combination of case and visit remuneration according to the problem.

4. In cases requiring the attention of the physician following the return home of a patient, would it be practicable to instruct the family physician as to the type of service required and for him to present his bill for services to the orthopedic surgeon who would endorse and present it to the orthopedic office for payment?

Answer: We firmly believe that the family physician should be compensated for follow-up treatment in the case of an

orthopedic case who is sent home before convalescence is completed. This would not add materially to the cost of the case as it might save by early discharge from the hospital sufficient to make up for the extra cost. The family physician should not be required to spend his time, talent, or material where follow-up work remains under the direction of the orthopedic surgeon.

5. In the event of the development of a non-orthopedic condition in the patient while under orthopedic care, should the family physician be compensated for his services by the Welfare Board?

Answer: Non-orthopedic conditions developing while under treatment for orthopedic problems should be compensated for by the State Department provided the complication is related to the orthopedic problem, is connected with or influenced by it. Disassociated illnesses should be handled as they would have been handled if the cases had not once been under orthopedic care.

6. It has been implied that a Medical Advisory Committee to the Orthopedic Division of the Welfare Board would be welcomed. Do you believe this committee should be composed of only physicians, not designated as orthopedic surgeons?

Answer: This is an important question and may have far-reaching effects. Your committee feels that there should be a committee of at least three, one of whom should be an orthopedic surgeon who can advise with the Welfare Department as a representative of the Montana State Medical Association. Your committee further feels that any and all funds appropriated for the care of the crippled children should be spent precisely for that purpose. Any attempt to divert these funds by broadening the field to include care outside of orthopedic conditions should be censured. Once an exception is made, there could be no limit to which the dissipation of pacifically appropriated funds could be carried.

LOUIS W. ALLARD, M.D.
 JOHN R. VASKO, M.D.
 E. M. PORTER, M.D.
 E. S. PORTER, M.D.
 J. K. COLEMAN, M.D.

REPORT OF ECONOMICS COMMITTEE

To the President and House of Delegates of the Medical Association of Montana: On April 2, 1939, a meeting was called of the Economics Committee at Helena, Montana. A discussion ensued as to the Medical and Hospital situation and its relation to public welfare. We asked our secretary, Dr. T. L. Hawkins, to contact Mr. A. G. Stacil, Manager of the Nicollet Clinic at Minneapolis, and President of the Minnesota Hospital Service Association of the Twin Cities, and invite him to Montana for the purpose of discussing and explaining "Group Hospitalization" to the Economics Committee and the Montana Hospital Association.

Dr. T. L. Hawkins made such arrangements and on May 10, 1939, Mr. A. G. Stacil spent some three hours explaining and discussing "Group Hospitalization" to the Economics Committee. In the afternoon of May 10, 1939, Mr. A. G. Stacil spoke to the members of the Montana Hospital Association. Following our meeting with Mr. A. G. Stacil, your Economics Committee then advised and requested the officers of the Montana State Medical Association to secure the services, and invite Mr. A. G. Stacil to attend the annual meeting of the Montana State Medical Association at Butte, on the 28th, 29th, and 30th

of June, 1939, for the purpose of speaking to the members of the profession and the delegates of the Association.

Following our meeting in Helena the subject of Articles of Incorporation and By-Laws was taken up, and tentative copies of each have been prepared. A joint meeting of the Economics Committee, and a committee from the Montana Hospital Association was called and has been in session for the last three days. We have corrected and modified Articles of Incorporation and By-Laws which shall become a part of this report and resolution.

Whereas: A combined meeting of the Montana Hospital Association and the Economics Committee of the State Medical Association have formulated certain plans and proposed "Articles of Incorporation" of the proposed "Montana Hospital Service Association";

Whereas: It is the opinion of the Medical Economics Committee that said proposed "Hospital Service Association" plan is for the good of public welfare of the State of Montana, and for the benefit of the people of the State of Montana needing hospitalization;

Now, therefore, be it resolved, that the House of Delegates approve said proposed plan, and that the Montana State Medical Association lend to said proposed plan their active support and aid.

J. C. SHIELDS, M.D., Chairman.
 J. P. RITCHEY, M.D.
 R. B. DURNING, M.D.
 FRED F. ATTIX, M.D.
 J. H. GARBERSON, M.D.

The Montana Hospital Association have approved "Group Hospitalization" and desire to incorporate "A Hospital Service Association." It is the unanimous opinion of your Economics Committee that such a plan of "Group Hospitalization" is feasible in this state. It is also our opinion that "Group Hospitalization" will do much to improve the public welfare, and be of great benefit and service to our commonwealth.

J. C. SHIELDS, M.D., Chairman.
 J. P. RITCHEY, M.D.
 R. B. DURNING, M.D.
 FRED F. ATTIX, M.D.
 J. H. GARBERSON, M.D.

REPORT OF HISTORICAL COMMITTEE

During the past we have made considerable progress in the work. This has been under the direction of Attorney Lew L. Callaway who has a thorough grasp of the historical data in the State of Montana and he has been re-writing much of the material. The material is entirely gathered and in good shape with the exception of the history covering the State Board of Health, the Rocky Mountain Spotted Fever work, the State Asylum at Warm Springs and the State Tuberculosis Sanitarium at Galen. This material has been promised repeatedly but it is very difficult to get the heads of these institutions to finish the work. However, I believe that results will be forthcoming during the coming year.

There is considerable re-writing and proof-reading from a medical standpoint of the work but I believe that this can be completed during the coming year. This Committee feels that an appropriation of \$500.00 should be made for this work, as considerable stenographic work is required. There has been no appropriation during the past year covering this work.

We therefore recommend that this work be continued and that an appropriation of \$500.00 be made to cover the expense.

THOS. F. WALKER, M.D.

MONTANA STATE MEDICAL ASSOCIATION DISTRICT SOCIETY ROSTER--1939

BIG HORN MEDICAL SOCIETY

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Baker, Geo. A. Schubert, J. W.
Haverfield, L. E.

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Anderson, Evon L. MacBurney, L. R.
Andrews, F. L. McGregor, H. J.
Bateman, H. W. MacGregor, J. C.
Blankenhorn, C. E. MacGregor, R. J.
Bresee, C. J. Mayland, L. L.
Cooper, D. J. McPhail, F. L.
Coulter, C. F. Nagel, C. E.
Crary, L. S. Peterson, C. H.
Davis, R. C. Place, B. A.
Durnin, R. B. Porter, E. M.
Gibson, H. V. Richardson, R. B.
Gleason, A. L. Russell, Rosannah
Greaves, J. P. Schemm, F. R.
Hitchcock, E. D. Setzer, G. W.
Holzberger, R. J. Silvernale, F. P.
Howard, L. L. Strain, Earle
Irwin, J. H. Templeton, C. V.
Johnson, A. C. Vasko, J. R.
Kaulback, J. J. Walker, Dora
Keenan, F. E. Walker, T. F.
Larson, E. M. Waniata, F. K.
Little, C. F. Weisgerber, A. L.
Logan, P. E. Williams, W. T.
Lord, B. E.

FERGUS COUNTY MEDICAL SOCIETY

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Attix, Fred F. Piedalue, J.
Deal, A. W. Porter, E. S.
Freed, Hazel Soltero, J. R.
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Gans, E. W. Welden, E. A.
Gans, P. J. Wilder, C. W.
Herring, J. H. Willess, H. F.

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Bottorf, Phoebe Lamb, J. A.
Brassett, Albert J. Martin, C. J.
Brown, James W. Moore, T. B., Jr.
Cairns, J. M. Munro, A. T.
Clark, C. A. Noble, P. C.
Cockrell, E. P. Richards, J. L.
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Griffis, L. G. Towne, R. L.
Hodgkin, W. E. Wright, G. B.
Holcomb, M. D.

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Grigg, E. R. Seitz, R. E.
Heetdirks, B. J. Sigler, R. R.
Kearns, E. J. Smith, C. S.
Maillet, L. L. Stanchfield, H.
Phillips, J. H. Whitehead, C. E.

HILL COUNTY MEDICAL SOCIETY

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Briggs, F. W. Lacey, W. A.
Delaney, J. R. MacKenzie, D. S.
Doles, E. A. MacKenzie, D. S., Jr.
Forester, W. L. McCannel, W. A.
Hamilton, W. F. Rogers, W. B.
Hoon, A. S. Sussex, L. T.

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Berg, D. T. Kilbourne, B. K.
Cashmore, W. F. Klein, O. G.
Cooney, S. A. Lindstrom, E. H.
Copenhaver, W. M. McCabe, James
†Fligman, L. H. Morris, R. W.
Flinn, J. M. Shearer, B. C.
Gallivan, E. L. Thompson, J. G.
Hall, L. F. Tyler, K. A.
Hawkins, T. L.

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Dyer, R. H.

MOUNT POWELL MEDICAL SOCIETY

Anderson, G. A. Long, W. E.
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Bolton, Leroy Malloy, F. J.
Brogan, R. E. Noonan, J. N.
Crowley, L. G. O'Rourke, L. J.
Dunlap, L. G. Pampel, B. L.
Dunn, J. C. Snodgrass, M. R.
Getty, R. W. Terrill, F. I.
Holmes, G. V. Unmack, F. L.
Kargacin, T. J. Veldhuis, J. G.
Knight, A. C. Willets, A. J.
Lieurance, E.

MUSSELLSHELL COUNTY MEDICAL SOCIETY

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Crouse, S. A. Person, E. C.
Fouts, E. R. Vornhott, Mark

NORTH CENTRAL MONTANA MEDICAL SOCIETY

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Leist, L. J. Power, H. W.
Meadows, W. A. Robinson, W. C.
Neraal, P. O. Schraeder, H. F.
Olsen, N. A.

NORTHEASTERN MONTANA MEDICAL SOCIETY

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Cloud, H. B. Lawson, C. W.
Cockrell, T. L. Munch, C. J.
Knapp, R. D. O'Donnell, J. E.
Knierim, F. M. Smith, A. N.
Kreft, A. J. Spatz, J. M.
Krogstad, L. T. Storkan, J. C.

PARK COUNTY MEDICAL SOCIETY

Baskett, L. W. Pearson, J. A.
Claiborn, D. R. Spittler, R. O.
Cogswell, W. F. Townsend, G. A.
Greene, P. L. Walker, R. E.
Harris, W. E. Windsor, G. A.
Leard, S. E.

SILVERBOW COUNTY MEDICAL SOCIETY

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Carmichael, G. A. Hale, D. E.
Casebeer, H. L. Hill, R. J.
Coleman, J. K. Horst, C. H.
Emery, C. E. James, H. H.
Floyd, J. S. Joesting, H. C.
Frisbee, J. B. Kane, J. J.
Garvey, J. E. Kane, P. E.
Gillespie, D. L. Kane, R. C.
Gold, M. A. Karsted, A.

Kroeze, R.
Lhota, J. F.
MacPherson, G. T.
Malee, F. H.
McMahon, E. S.
Monahan, R. C.
Mondloch, J. L.
Morse, A. W.
O'Keefe, N. J.
Packard, L. R.
Pemberton, C. W.
Peterson, R. F.
Poindexter, F. M.
Routledge, G. L.
Saam, T. W.
Schwartz, H.

Schwartz, S. E.
Shanley, T. J. B.
Shields, J. C.
Sievors, A. R.
Sievors, J. R. E.
Simons, Harold
Smetters, McCormick
Smith, L. W.
Spurck, P. T.
Steinberg, S. S.
Stephan, W. H.
Thorkelson, J.
Ungherini, V. O.
Wilking, S. V.
Williams, F. J.

Graybeal, J. M.
Haas, A. T.
Hall, H. J.
Hayward, Herbert
Hiemstra, A. W.
Hesdorffer, M. B.
Holmes, J. T.
Honeycutt, C. F.
Jennings, G. M.
Kintner, A. R.
Lowe, Fred H.
Marshall, J. F. S.
Marshall, W. J.
Martin, L. P.
McGill, Caroline
McPhail, W. N.
Murphy, E. S.

Nelson, J. M.
Ohlmacher, J. P.
Pease, F. D.
Randall, J. G.
Rennick, P. S.
Rew, A. W.
Ritchey, J. P.
Rodes, C. B.
Sale, G. G.
Shephard, H. C.
Smith, H. C.
Tefft, C. C.
Thornton, C. R.
Thornton, W. T.
Trenouth, S. M.
Turman, G. F.

SOUTHEASTERN MONTANA MEDICAL SOCIETY

Beagle, J. S.
Benson, R. D.
Bridenstine, I. J.
Blakemore, W. H.
Cotton, Wendell
Damm, W. P.
Danskin, M. G.
Denman, H.
†Evert, J. A.
Farrand, B. C.
Garberson, J. H.
Halleck, P. P.
Harper, R. D.
Haywood, G. T.
Hogeboom, C. T.
Howard, E. M.
Huene, H. J.

Hunt, J. H.
Lemon, R. G.
Lindeberg, S. B.
Lund, Carroll
Morrill, R. A.
Neville, J. V.
Olson, S. A.
Randall, R. R.
Rowen, E. H.
Sandy, B. B.
Shillington, M. A.
Tarbox, B. R.
Thompson, J. R.
Varco, A. R.
Wesson, H.
Winter, M. D.

WESTERN MONTANA MEDICAL SOCIETY

Alderson, L. R.
Bourdeau, C. L.
Bourdeau, E. J.
Brewer, L. W.
Browning, H. D.
Creelius, H. A.
Doyle, W. J.

Flynn, J. J.
Foss, A. R.
Fredrickson, C. H.
French, E. G.
George, E. K.
Golley, P. M.
Gordon, D. A.

YELLOWSTONE VALLEY MEDICAL SOCIETY

Adams, E. M.
Allard, L. W.
Beltzer, Chas. E.
Blackstone, A. V.
Bridenbaugh, J. H.
Brunkow, B. H.
Caraway, H. T.
Chapple, R. R.
Clark, A. E.
Culbertson, H. H.
Drew, H. O.
Dunkle, Frank
Farr, E. M.
Ferree, V. D.
Gordon, Wayne
Graham, J. H.
Griffin, P. E.
Hagmann, E. A.
Hall, E. C.
Hammerel, A. L.
Hanley, R. J.
Harmon, D. S.
Hodges, D. E.

Hurd, F. D.
Hynes, J. E.
Kronmiller, L. H.
Leeper, D. D.
McIntyre, H. E.
Morledge, Roy V.
Morrison, W. R.
Movius, A. J.
Nelson, C. H.
Powers, J. C.
Rathman, O. C.
Rich, E. L.
Richards, W. G.
Russell, G. M.
Russell, L. G.
Smith, W. P.
Souders, S. M.
Stevens, L. S.
Stripp, A. E.
Stubblebine, J. G.
Vye, T. R.
Weedman, W. E.
Wernham, J. I.

†Deceased.

ALPHABETICAL ROSTER
Montana State Medical Association-1939

Adams, E. M. Red Lodge
Alderson, L. R. Missoula
*Alexander, J. L. Winnett
Allard, L. W. Billings
Allred, Ivan A. Great Falls
Almas, D. J. Havre
Anderson, Evon L. Fort Benton
Anderson, G. A. Deer Lodge
Andrews, F. L. Great Falls
Atkins, D. A. Butte
Attix, Fred F. Lewistown
Andrews, Francis W. Havre
Baker, Geo. A. Hardin
Barbour, Geo. H. Helena
Baskett, L. W. Big Timber
Bateman, H. W. Choteau
Bayles, R. G. Townsend
Beagle, J. S. Sidney
Beasley, Warren A. Galen
Beltzer, Chas. E. Washoe
Benjamin, M. B. Crow Agency
Bennett, A. A. Roundup

Benson, O. G. Plentywood
Benson, R. D. Sidney
Berg, David T. Helena
Blackstone, A. V. Columbus
Blakemore, W. H. Baker
Blankenhorn, C. E. Great Falls
Bole, W. S. Bozeman
Bolton, Leroy Deer Lodge
Borkon, M. Whitefish
Bottorf, Morris W. Kalispell
Bottorf, Phoebe Kalispell
Bourdeau, C. L. Missoula
Bourdeau, E. J. Missoula
Brassett, Albert J. Kalispell
Bresee, C. J. Great Falls
Brewer, A. D. Bozeman
Brewer, L. W. Missoula
Bridenbaugh, J. H. Billings
Bridenstine, I. J. Terry
Briggs, F. W. Havre
Brogan, R. E. Deer Lodge
Brown, James W. Whitefish

Browning, H. D. Hamilton
Brunkow, Benj. H. Billings
Cairns, J. M. Libby
Canty, Chas. R. Butte
Caraway, H. T. Billings
Carmichael, Glen A. Butte
Casebeer, H. L. Butte
Cashmore, W. F. Helena
Chapple, R. R. Billings
Claiborn, D. R. Big Timber
Clancy, D. F. Ennis
Clark, A. E. Billings
Clark, C. A. Eureka
Cloud, H. B. Wolf Point
Cockrell, E. P. Kalispell
Cockrell, T. L. Hinsdale
Cogswell, W. F. Helena
Coleman, J. K. Butte
Conway, W. Q. Kalispell
Cooney, S. A. Helena
Cooper, Denton J. Big Sandy
Copenhaver, W. M. Helena

Cotton, Wendell	Circle	Harper, R. D.	Sidney	Lowe, Fred H.	Missoula
*Coulter, Chas. F.	Great Falls	Harris, W. C.	Livingston	Lund, Carroll	Fairview
Crary, L. S.	Fairfield	Haverfield, L. E.	Hardin	Macaulay, A. M.	Great Falls
Crecelius, H. A.	Plains	Hawkins, Thos. L.	Helena	MacBurney, LeRoy	Great Falls
Crouse, S. A.	Roundup	Hayward, Herbert	Hamilton	MacGregor, H. J.	Great Falls
Crowley, L. G.	Warm Springs	Haywood, G. T.	Forsyth	MacGregor, J. C.	Great Falls
Culbertson, H. H.	Billings	Heetderks, B. J.	Bozeman	MacGregor, R. J.	Great Falls
Dale, E. E.	Cut Bank	Herring, J. H.	Lewistown	MacKenzie, D. S., Jr.	Havre
Damm, W. P.	Terry	Hershey, Edythe	Helena	MacKenzie, D. S.	Havre
Danskin, M. G.	Glendive	Hesdorffer, M. B.	Missoula	MacPherson, G. T.	Butte
Davis, R. C.	Great Falls	Hiemstra, A. W.	Missoula	Maillet, L. L.	Three Forks
*Deal, A. W.	Lewistown	Hill, R. J.	Whitefish	Malee, F. H.	Butte
Delaney, J. R.	Chester	Hitchcock, E. D.	Great Falls	Malee, J. J.	Anaconda
Denman, H.	Baker	Hodges, D. Ernest	Billings	Malloy, F. J.	Anaconda
Dodge, A. A.	Kalispell	Hodgkin, W. E.	Kalispell	Marshall, J. F. S.	Missoula
Doles, E. A.	Havre	Hogeboom, C. T.	Baker	Marshall, W. J.	Missoula
Doyle, W. J.	Superior	Holcomb, Mark D.	Whitefish	Martin, C. J.	Libby
Drew, H. O.	Billings	Holmes, G. V.	Warm Springs	Martin, L. P.	Missoula
DuBois, W. L.	Conrad	Holmes, J. T.	Missoula	Mayland, L. L.	Great Falls
Dunkle, Frank	Billings	Holzberger, R. J.	Great Falls	McCabe, James	Helena
Dunlap, L. G.	Anaconda	Honeycutt, C. F.	Missoula	McCannel, W. A.	Harlem
Dunn, J. C.	Warm Springs	Hoon, A. S.	Chinook	McGill, Caroline	Butte
Durnin, R. B.	Great Falls	Horst, C. H.	Butte	McIntyre, H. E.	Billings
Dyer, R. H.	Sheridan	Houtz, Chas. S.	Havre	McMahon, E. S.	Butte
Emery, C. E.	Butte	Howard, Elna M.	Miles City	McPhail, F. L.	Great Falls
Eneboe, P. L.	Bozeman	Howard, L. L.	Great Falls	McPhail, W. N.	Missoula
†Evert, J. A.	Glendive	Huene, H. J.	Forsyth	Meadows, W. A.	Sunburst
Farnsworth, F. B.	Virginia City	Huggins, N.	Kalispell	Monahan, R. C.	Butte
Farr, E. M.	Billings	Hunt, J. H.	Glendive	Mondloch, J. L.	Butte
Farrand, B. C.	Jordan	Hurd, F. D.	Billings	Moore, T. B., Jr.	Kalispell
Ferree, V. D.	Bridger	Hynes, John E.	Billings	Morledge, Roy V.	Billings
†Fligman, L. H.	Helena	Irwin, J. H.	Great Falls	Morrill, R. A.	Sidney
Flinn, J. M.	Helena	James, H. H.	Butte	Morris, R. Wynne	Helena
Floyd, J. S.	Butte	Jennings, G. M.	Missoula	Morrison, W. R.	Billings
Flynn, J. J.	Missoula	Jestrab, G. A.	Havre	Mosso, A. W.	Butte
Forester, W. L.	Havre	Joesting, H. C.	Butte	Movius, A. J.	Billings
Foss, A. R.	Missoula	Johnson, A. C.	Great Falls	Munch, C. J.	Culbertson
Fouts, E. R.	Ryegate	Johnson, R. G.	Harlowton	Munro, A. T.	Kalispell
Fredrickson, Clyde H.	Missoula	Jump, C. F.	Helena	Murphy, E. S.	Missoula
Freed, Hazel	Stanford	Kane, Jos. J.	Butte	Nagel, C. E.	Great Falls
French, E. G.	Ronan	Kane, P. E.	Butte	Nelson, C. H.	Billings
Frisbee, J. B.	Butte	Kane, R. C.	Butte	Nelson, J. M.	Stevensville
Gallivan, E. L.	Helena	Kargacin, Tom J.	Anaconda	Neraal, P. O.	Cut Bank
Gans, E. M.	Harlowton	Karsted, A.	Butte	Neville, J. Vernon	Forsyth
Gans, E. W.	Harlowton	Kaulback, J. J.	Fort Benton	Noble, P. C.	Polson
Gans, Paul J.	Lewistown	Kearns, E. J.	Bozeman	Noonan, J. N.	Anaconda
Garberson, J. H.	Miles City	Keenan, F. E.	Great Falls	Ohlmacher, J. P.	Missoula
Garvey, J. E.	Butte	Kell, W. L.	Columbia Falls	O'Donnell, J. E.	Fort Peck
George, E. K.	Missoula	Kilbourne, B. K.	Helena	O'Keefe, N. J.	Butte
Getty, R. W.	Galen	Kintner, A. R.	Missoula	Olsen, N. A.	Cut Bank
Gibson, H. V.	Great Falls	Klein, Otto G.	Helena	Olson, S. A.	Glendive
Gillespie, D. L.	Butte	Knapp, R. D.	Wolf Point	O'Rourke, Leo J.	Anaconda
Gleason, A. L.	Cascade	Knierim, F. M.	Glasgow	Packard, L. R.	Whitehall
Gold, M. A.	Butte	Knight, A. C.	Philipsburg	Pampel, B. L.	Warm Springs
Golley, P. M.	Missoula	Kreft, A. J.	Fort Peck	Paterson, W. F.	Conrad
Gordon, Donald A.	Hamilton	Kroeze, R.	Butte	Pearson, J. A.	Livingston
Gordon, Wayne	Billings	Krogstad, L. T.	Wolf Point	Pease, F. D.	Missoula
Graff, Sarah F.	Butte	Kronmiller, L. H.	Billings	Pemberton, C. W.	Butte
Graham, J. H.	Billings	Labbitt, L. H.	Hardin	Person, E. C.	Roundup
Graybeal, J. M.	Missoula	Lacey, W. A.	Havre	Peterson, C. H.	Great Falls
Greaves, J. P.	Great Falls	Lamb, J. A.	Kalispell	Peterson, R. F.	Butte
Greene, P. L.	Livingston	Larson, C. B.	Glasgow	Phillips, J. H.	Bozeman
Gregg, Harold	Butte	Larson, E. M.	Great Falls	Piedalue, Jos.	Lewistown
Griffin, P. E.	Billings	Lawson, Chester W.	Glasgow	Place, B. A.	Great Falls
Griffis, L. G.	Kalispell	Leard, S. E.	Livingston	Poindexter, F. M.	Dillon
Grigg, E. Roy	Bozeman	Leeper, D. D.	Laurel	Porter, E. M.	Great Falls
Haas, A. T.	Missoula	Leist, L. J.	Cut Bank	Porter, E. S.	Lewistown
Hagmann, E. A.	Billings	Lemon, R. G.	Glendive	Powell, C. D.	Valier
Hale, D. E.	Butte	Lewis, G. A.	Roundup	Power, H. W.	Conrad
Hall, E. C.	Laurel	Lhotka, J. F.	Butte	Powers, J. C.	Billings
Hall, H. J.	Missoula	Lieurance, E.	Warm Springs	Randall, J. G.	Missoula
Hall, L. F.	Helena	Lindeberg, Sadie B.	Miles City	Randall, R. R.	Miles City
Halleck, P. P.	Broadus	Lindstrom, E. H.	Helena	Rathman, O. C.	Billings
Hamilton, W. F.	Havre	Little, Chas. F.	Great Falls	Rennick, P. S.	Stevensville
Hammerel, A. L.	Billings	Logan, P. E.	Great Falls	Rew, A. W.	Thompson Falls
Hanley, R. J.	Billings	Long, W. E.	Anaconda	Rich, E. L.	Billings
Harmon, D. S.	Worland, Wyo.	Lord, B. E.	Great Falls	Richards, J. L.	Polson

Richards, W. G.	Billings	Silvernale, F. P.	Great Falls	Towne, R. L.	Kalispell
Richardson, R. B.	Great Falls	Simons, Harold	Butte	Townsend, G. A.	Livingston
Ritchey, J. P.	Missoula	Smetters, McCormick	Butte	Trenouth, S. M.	Missoula
Robinson, W. C.	Shelby	Smith, A. N.	Glasgow	Turman, G. F.	Missoula
Rodes, C. B.	Butte	Smith, C. S.	Bozeman	Tyler, K. A.	Boulder
Rogers, W. B.	Havre	Smith, H. C.	Missoula	Ungherini, V. O.	Butte
Ross, F. B.	Kalispell	Smith, L. W.	Butte	Unmack, Frank L.	Deer Lodge
Routledge, Geo. L.	Dillon	Smith, W. P.	Columbus	Varco, A. R.	Miles City
Rowen, E. H.	Miles City	Snodgrass, M. R.	Anaconda	Vasko, John R.	Great Falls
Russell, G. M.	Billings	Soltero, J. R.	Lewistown	Veldhuis, J. G.	Warm Springs
Russell, Leland G.	Billings	Souders, S. M.	Red Lodge	Vornhott, Mark	Roundup
Russell, Rosannah	Simms	Spatz, J. M.	Glasgow	Vye, T. R.	Laurel
Saam, T. W.	Butte	Spittler, Russell O.	Livingston	Walker, Dora V. H.	Great Falls
Sabo, F. I.	Bozeman	Spurck, P. T.	Butte	Walker, R. E.	Livingston
Sale, G. G.	Missoula	Stanchfield, H.	Manhattan	Walker, Thos. F.	Great Falls
Sandy, B. B.	Ekalaka	Steinberg, S. S.	Butte	Wallin, C. C.	Lewistown
Schemm, F. R.	Great Falls	Stephan, W. H.	Dillon	Waniata, F. K.	Great Falls
Scherer, R. G.	Bozeman	Stevens, L. S.	Billings	Weedman, W. E.	Billings
Schraeder, H. F.	Browning	Storkan, Jos. C.	Plentywood	Weisgerber, A. L.	Great Falls
Schubert, J. W.	Hardin	Strain, Earle	Great Falls	Welden, E. A.	Lewistown
Schwartz, Harold	Butte	Stripp, A. E.	Billings	Wernham, Jas. I.	Billings
Schwartz, S. E.	Butte	Stubblebine, Jas. G.	Big Timber	Wesson, H.	Miles City
Seerley, C. C.	Bozeman	Sussex, Lloyd T.	Havre	Whitehead, C. E.	Bozeman
Seitz, R. E.	Bozeman	Tarbox, Byron R.	Baker	Wilder, Curtis W.	Lewistown
Setzer, G. W.	Malta	Taylor, W. W.	Whitefish	Wilking, S. V.	Butte
Shanley, T. J. B.	Butte	Tefft, C. C.	Hamilton	Willess, H. F.	Lewistown
Shearer, Beryl C.	Helena	Templeton, C. V.	Great Falls	Williams, F. J.	Butte
Shephard, H. C.	Missoula	Terrill, F. I.	Galen	Williams, W. T.	Malta
Shields, J. C.	Butte	Thompson, John G.	Helena	Willits, A. J.	Anaconda
Shillington, M. A.	Glendive	Thompson, James R.	Miles City	Windsor, G. A.	Livingston
Sievers, A. R.	Butte	Thorkelson, J.	Butte	Winter, M. D.	Miles City
Sievers, J. R. E.	Butte	Thornton, C. R.	Missoula	Wright, G. B.	Kalispell
Sigler, R. R.	Bozeman	Thornton, W. T.	Missoula		

*Life Membership.

†Deceased.

Report of Committee on Organization and Administration, American Student Health Association*

Helen B. Pryor, M.D.†

Palo Alto, California

Round Table No. I. Representatives from all state-supported and large endowed co-educational colleges and universities. *Sub-chairman*, Dr. Ruby Cunningham, University of California.

Round Table No. II. Representatives from all small endowed co-educational colleges and universities. *Sub-chairman*, Dr. George T. Blydenburgh, Ohio Wesleyan University.

Round Table No. III. Representatives from Women's Colleges. *Sub-chairman*, Dr. Grace Hiller, Goucher College.

Round Table No. IV. Representatives from Men's Colleges. *Sub-chairman*, Dr. J. P. Ritenour, Pennsylvania State College.

Round Table No. V. Representatives from municipal colleges and universities having almost exclusive day school enrolments. *Sub-chairman*, Dr. F. A. Woll, College of the City of New York.

Round Table No. VI. Representatives from Teachers Colleges. *Sub-chairman*, Dr. Glenadine Snow, Michigan State Normal College.

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On Friday, December 30, from 10:30 a. m. to 12 m., Drs. Cunningham, Blydenburgh, Hiller, Ritenour, Woll and Snow brought in summarized reports of the previous day's Round Tables, aided by discussions from the floor.

*Presented before the American Student Health Association, New York City, December 29, 1938.

†Health Service, Stanford University.

Dr. Cunningham in reporting the discussion on "Standardization of Items in the Health Examination of Entering Students" recommended:

1. The use of the method for visual appraisal prepared by the Committee on Eye Health.

2. The use of the audiometer to measure hearing acuity.

3. The use of certain refinements of the old height-weight tables in evaluating nutrition. She referred to Dr. Diehl's figures from the various colleges and certain insurance tables. The superiority of the Width-weight Tables was pointed out and also the fact that without taking body build into consideration an injustice is done in appraising nutrition for approximately one-third of the student body.

4. The use of the tuberculin skin test followed up by fluoroscopy and chest plates on positive reactors. In spite of the fact that the accuracy of the tuberculin skin test has been challenged, Dr. Lee H. Ferguson reassured the session of its dependability.

Discussion of the question "How Can We Improve Follow-up Work Leading to Correction of Remedial Defects" brought out:

1. The paradoxical fact that in places where comparative studies are made at entrance, during progress, or at the end of the college course, it has been found that while remedial defects decrease, health habits become steadily worse,

2. The practice of removing or correcting remedial defects varies a good deal in different places. Only one place was reported where all students with remedial defects are sent to the local hospital for treatment. In some places certain defects are corrected, while others are recommended for correction. Such recommendations are made in personal conferences with the student in some institutions, and by letter to the student in others.

3. There was a lively discussion of whether health advice should be made compulsory, semi-compulsory, or should be merely friendly advice. It was pointed out that correction of defects under compulsion may end disastrously and that it is more advisable to urge certain corrections be done by the family physician at home.

4. The cost to the state or to the college of financing higher education was advanced as an economic reason for graduating healthy students.

The best method of financing student health work was found to differ in each locality. In most instances the health service is financed from student fees. Since most of the health services felt the need of better support, several suggestions were made:

1. Since the entrance examination functions for administrative purposes as well as for the good of the student, it may be paid for from general or tuition fees, leaving health fees for the care of illness.

2. Where health education as formal instruction is undertaken by the staff of the health service, a part of its salary should be met from general teaching funds and not only from student health fees.

3. It was suggested that we consider defects present at the time of matriculation not a responsibility of the health service, and charge for their correction, adding money so obtained to health service funds. These conditions might include pathological tonsils, hernias, refractive errors, etc.

4. In certain localities it has been possible to make use of army and navy physicians to help with entrance physical examinations. Because of variation in this opportunity in different places and at different times, it was suggested that the problem of making the best use of help from this source available to as many as are interested in it be investigated by the officers of our organization.

5. The inclusion of faculty in the student health service benefits was touched upon briefly. In general, faculty are not included. Where faculty benefit by a health service it is usually in a limited way and called for by only a small number of faculty members.

It was pointed out that industry presents a solid front in demanding certain standards of health and physical fitness of its employees. This emphasizes the possibility and the necessity for establishing standards of health for students. Certain students now shop about among teachers' colleges and various state universities for a place in which their defects will be overlooked. Uniformity of standards would help to defeat this tendency. In certain places some method of excluding from the teaching profession the emotionally or mentally unprepared is being sought and demanded. The problem of certification of teachers is of great importance to the group representing the teacher-training institutions.

The possibility and desirability of setting up health standards for certification of teachers was reported on by Dr. Snow. Certain difficulties were recognized as follows:

1. State and tax-supported colleges cannot easily refuse admission to students who want to register. Connecticut is the only state which has a definite law listing certain defects which will exclude students from its teacher-training institutions.

2. Most teacher-training institutions must admit all students desiring to enroll and are faced at the end of the second year with the necessity of advising certain students against continuing their courses.

3. All present agreed that some selection of students is necessary. It was suggested that teachers should be "able-bodied", which was defined as being: (a) able to perform their duties in a capable manner; (b) have the ability to see and hear across the classroom; (c) be able to play with their students.

Certain objections were raised to each and every item listed as a cause for refusing certification of teachers. However, it was felt that such problems should not be solved by the health service alone, but must be considered coöperatively with the personnel department or placement bureau.

4. The question "Can the Handicapped Student be Placed in a Teaching Position when He Finishes His Training" was debated. There is a growing demand for teachers of handicapped children which provides places for some teachers in special schools, for example, for the care of orthopedic cases, or blind or deaf children.

5. No definite conclusions were reached as to the items to be included in a list for which certification of teachers would be refused. It was decided that every teacher in training should be considered individually.

Doctor Ritenour discussed certain health service problems from the point of view of the college administrator. He pointed out that:

1. Parents expect the college to take an interest in each student and care for him when ill.

2. If no full-time doctor is employed by the college for this purpose, there is likelihood that a charge of favoritism may be lodged against any part-time doctor in such a position by the local private practitioners.

3. The limits of health care by the college were discussed and the question raised as to responsibility for surgery, etc.

4. It was recommended that students be admitted to college only after passing the college physical examination to avoid wasting taxpayers' money by admitting ill students.

Doctor Blydenburgh's group discussed development of clinic service and infirmary or hospitalization facilities.

1. They felt that these questions could not be answered in detail for every group; they have to be answered by each institution, and the answers would depend a great deal upon location, financial resources, personnel and type of student.

2. However, the answers should be made with the idea in mind that the college is not in the practice of medicine; it is not in the business of running what is usually understood as a dispensary or a hospital. It is running a health service in which these two agencies help the institution to give health instruction, find and correct, or urge correction of defects, prevent disease as much as is possible, and give minor and emergency therapeutic aid.

3. The answers also should be shaped by the realization that most of the students in our group are minors away from home, usually without much money. The institution through its health service needs in a restricted way to act for and in place of parents. This means supervising the student's health in giving treatment and in providing an adequate place for the bed care of those complaints which in most cases would be in bed at home.

4. Various kinds of hospital insurance for student groups were also discussed, but it was pointed out that hospitalization, carried out in the usual student hospital, not undertaking responsibility for the treatment of serious medical or surgical cases, was quite different from the hospitalization usually considered in such hospital insurance plans. It was thought, however, that these plans might be useful in caring for hospitalization beyond that offered by the college.

Doctor Hiller reported extensive discussion of various health and hospital insurance schemes that have been tried by various colleges not maintaining infirmaries or hospitals for students. At Wellesley an accident insurance scheme was tried and discontinued. At Radcliffe a commercial insurance company gave coverage for one year and then discontinued the service. At Vassar a non-profit plan providing a rather complete coverage was tried, but so many students had operations during the summer vacation that the cost of coverage was raised from \$12.00 to \$15.00 per year. The Antioch Plan giving consultation and laboratory service was found very satisfactory where the college is located in a small town remote from a large city or a medical school.

It was felt that the entrance physical examination should include all the valuable aids to diagnoses that are possible to get.

It was recommended that all the information obtained about a student should be discussed with him as an educational tech-

nique in an attempt to teach health principles. An effort should be made to keep in close contact with the family doctor on all health conditions that develop while a student is in school.

It was recommended that the health service try to penetrate the educational field, in an attempt to check the growing tendency of allowing a student a load too heavy for his best health interest. It was pointed out that pressures should be regulated in student loads of outside social activity as well as academic work.

Dr. L. B. Chenoweth in reporting for Dr. Woll, pointed out that the health service problems of municipal universities differ from others in that most of these students live in their own homes.

1. It was felt that students with physical defects should be referred to their own family physicians. At the College of the City of New York the family of the student is called into consultation whenever a health decision is made. If surgery is necessary it is required to be done before the student is allowed to register.

2. Students must have certain physical defects corrected or be excluded from classes.

3. Periodic health examinations are considered a very important part of the work of the health service. This is really a continuation of school health examinations done at the secondary level and should be made an educational process. The aim is to help the student develop the habit of periodic health examinations.

4. At the College of the City of New York physical examinations are not given the whole student body, but are given in certain departments only. In other colleges all freshmen are examined. It was found generally true that Schools of Education always ask for the most service.

5. Municipal universities have a special problem of keeping good relations with a local medical society. At the College of the City of New York records are kept of fees paid and of the number of cases referred to local doctors. At Wayne University 2500 students were referred to outside doctors in one year.

6. The problem of diagnoses of the family physicians not concurring with the college physicians' diagnoses was discussed. It was decided that the diagnoses of family physicians must always be taken, if trouble is to be avoided.

Hyperimmune Human Serum in the Prophylaxis and Treatment of Pertussis

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EVALUATION of convalescent serum in pertussis is very difficult. Because of the length of the incubation period and the extreme variability of the disease, results are hard to interpret. However, the seriousness of the disease in infancy and the fact that whooping cough and its complications cause so many deaths under the age of two, makes it necessary that we try rational new methods of treatment. Meader¹ reviewing the board of health statistics of Detroit from 1920 to 1927 found the following mortality per 100 cases reported:

Year	Cases Reported	Deaths per 100
1920	2,790	4.9
1921	2,691	4.0
1922	2,469	3.6
1923	2,745	3.0
1924	2,062	2.8
1925	3,305	2.6
1926	3,041	2.9
1927	3,646	1.7

Since 1928 convalescent serum has been used in the prevention and attenuation of pertussis in Detroit. Considering the large number of cases involved, perhaps the lowering of the death rate from pertussis before and after serum introduction may be significant.

The statistics for the ten year period from 1928 through 1937 follow:

Year	Cases Reported	Deaths per 100
1928	5,395	1.6
1929	4,100	2.2
1930	3,467	1.3
1931	5,389	1.2
1932	5,922	1.3
1933	4,986	0.9
1934	4,304	0.7
1935	5,587	0.8
1936	7,433	0.6
1937	3,352	0.7

This type of analysis gives us some basis for conclusion as to the merit of a given form of treatment, but of course is not a controlled experiment. Meader followed 183 children exposed to whooping cough and found that 121, or 66 per cent of them developed the disease. With this as a control he studied 115 children who had been given prophylactic serum and found that 28 per cent developed the disease. Debré² gave injections of 2 to 3 cc. of pooled serum to forty infants. Thirty-one were completely protected, in six whooping cough developed, and three suffered from the disease in average intensity. Debré believed that convalescent serum given during the period of incubation completely protected the exposed child; that given at the end of the incubation period resulted in attenuation; and that given after the disease was well established had no great effect. Bradford³ ran a controlled series of cases exposed to pertussis in the family to determine the effect of con-

valescent serum and whole blood when given during the incubation period and during the catarrhal stage. When convalescent serum was given to 27 children in the incubation stage, 15 or 55 per cent contracted whooping cough. Ten, or 66 per cent, had a mild form, and one had a complication consisting of tonsillitis in the sixth week. Of 20 controls, all of whom developed the disease, eight, or 40 per cent, had a mild attack; four, or 20 per cent, had complications consisting of otitis media, bronchitis, and pneumonia. When given during the catarrhal stage, the resultant disease was about the same in the treated and control groups, except that the controls showed one pneumonia out of 13 cases.

Stokes, McGuinness, and Armstrong⁴ have recently made use of hyperimmune pertussis serum. Young adults giving a history of pertussis were given three complete series of Sauer's vaccine at intervals of three months. The serum from these donors was found to have a high agglutination titer, 1-5,000, and a high opsonocytaphagic index against *Hemophilus pertussis*. The above workers used this serum to study its effect on the prophylaxis and treatment of whooping cough. Their results are tabulated in the following tables:

Philadelphia Serum Exchange Whooping Cough Prophylaxis
Hyperimmune Human Serum (Lyophile)
81 Cases

	No Disease	Very Mild Disease*	Mild Disease**	Moderate Disease
Intimate Exposure (continuous)	44	5	3	3
Intimate Exposure (short duration)	5	5	0	0
Casual Exposure (includes ward contacts)	16	0	0	0
Totals	65 or 80.3%	10 or 12.5%	3 or 3.7%	3 or 3.7%

*No whooping or vomiting, mild cough of short duration.

**Whooping, but no vomiting, short duration.

Dosage of Serum Used

10 to 20 cc. depending on age of child and intensity of exposure. Serum injection should be repeated in 5 to 7 days.

4 cc. of diluent used for each 10 cc. of original serum. (Serum is distributed in desiccated state).

Philadelphia Serum Exchange Whooping Cough Treatment
Hyperimmune Human Serum (Lyophile)
100 Cases

Result	Number of Patients
Excellent	32
Good	31
Moderate	20
Questionable	14
Deaths	3*

Dosage of Serum Used

10 to 20 cc. repeated 3 or 4 times.

4 cc. of diluent used for each 10 cc. of original serum.

*One child died four days following the initial dose of serum, one child died within 36 hours following the initial dose of serum, and the third child died within 24 hours following the initial dose. All three cases had bronchopneumonia.

Experimentally, Bradford⁵ has contributed much fundamental research. He has shown that intratracheal inoculation of *H. pertussis* into a mouse will produce

consistently uniform findings in the lungs. He has made use of investigations of humoral immunity in pertussis chiefly directed toward studies relating to specific agglutinins and complement-fixing antibodies. One direction his recent work has taken concerns the study of the opsonocytaphagic reaction of the blood, as suggested by Veitch and applied by Huddleson.⁶

The opsonocytaphagic reaction is a test for the opsonizing antibody in the serum as well as for the phagocytosing power of the leukocytes. The technique of determining the opsonocytaphagic reaction consisted of mixing 0.05 cc. of whole blood obtained as it flowed freely from a small incision in the finger tip, with 0.05 cc. of 1 to 1,000 solution of heparin or physiological salt solution. To this was added 0.05 cc. of a standard killed (merthiolate 1-10,000) suspension of Phase I *H. pertussis* organisms containing approximately ten billion organisms per cc. The organisms were added within 30 minutes after the blood was withdrawn, the mixture was shaken and placed in a 37° C. water bath for 30 minutes. A second shaking was done after 15 minutes of incubation. At the end of the 30 minute period, without further shaking, smears were made, fixed with methyl alcohol, and stained by the Giemsa method for 20 minutes, washed, dried, and examined under oil immersion.

A series of 25 consecutive polymorphonuclear leukocytes were examined and the organisms engulfed in each were counted. The cells were then classified according to the number of organisms engulfed. Three arbitrary groups were used to denote the degree of phagocytosis as follows:

None to slight	0 to 4 organisms
Definite	5 to 19 organisms
Marked	20 or more organisms

He studied this reaction during and after pertussis.⁷ The table below shows the opsonocytaphagic reaction of the blood during the course of pertussis:

Distribution

Week of Disease	Patients Tested	0-4	5-19	20 plus
1 and 2	13	2.8	18	4.2
3 and 4	15	1.3	14.5	9.2
5 and 6	12	0.8	9.5	14.6
7 and 8	9	0.6	8.6	15.1

As convalescence approaches there is an increase in the cells in the 20 plus column and a decrease in the other two.

Comparing children of various age groups who gave no history of pertussis with those who have a positive history of pertussis, it was shown that the latter had a higher opsonocytaphagic index. It was noted, however, that older children gave a moderately high test because of the presence of normal opsonins. Comparing the blood of mothers with that of their new-born babies, Bradford found that babies of mothers with a history of pertussis gave a higher test than the others. This

suggests placental transfer of the antibody in certain instances.

In vitro experiments conducted along similar lines except for the addition of 0.05 cc. of immune adult serum increased the opsonocytaphagic index markedly.⁸ Because of the increase in the opsonocytaphagic reaction in the blood of individuals who have a history of pertussis and were subsequently hyperimmunized, this procedure has been recommended by Bradford to make available a group of donors for convalescent serum. At a recent meeting of the American Pediatric Society,⁹ he reported his results and recommended highly the use of hyperimmune donors. He found that hyperimmune (lyophile) serum protected young mice against death from experimentally induced infection with *H. pertussis*, when the serum was injected at the same time that the organisms were administered.¹⁰ Thirty-two from a group of 40 treated mice survived, while only four survived from a group of 40 controls. The degree of lung involvement in the treated group was definitely less than in the controls. The difference between the groups in respect to the number of mice showing negative lung cultures at autopsy was also statistically significant. Sulfapyridine, in daily dosages of 20 mg. per mouse administered for three days failed to protect either three or six weeks old mice. Combined treatment, consisting of sulfapyridine by mouth and immune serum by injection, protected both three and six weeks old mice, but the protection was no greater in the younger animal than that produced by the serum alone. He also tested the effect of hyperimmune human serum (lyophile) upon the humoral antibody titer in pertussis. A group of 19 infants and 3 children in the early stage of pertussis were treated by the intramuscular injection of from 10 to 40 cc. of hyperimmune human serum (lyophile). In 19 of the group, the opsonocytaphagic reaction and agglutinin titers of the blood were determined immediately before and after serum injection.¹¹ The humoral antibodies as measured by these methods were increased to levels comparable to those characteristic of convalescence. A definite decrease in the absolute number of lymphocytes in the blood was noted in 15 of the 22 cases, and

there was apparent improvement in the clinical course of the disease in 18 of the 22 cases treated with the serum.

The Human Serum Laboratory has prepared hyperimmune serum by actively immunizing a group of medical students, all of whom give a history of pertussis. They have received three courses of vaccine at three months intervals, and have a high agglutination titer against *H. pertussis*. In the light of the findings with the use of hyperimmune human serum in pertussis, it is recommended that this material be more widely used. The period of early infancy is practically devoid of protection against pertussis. Since the mortality rate is so high at this time, it would seem wise to offer passive immunity in case of exposure or actual disease. Prophylactic use of 10 cc. of hyperimmune serum and therapeutic use of 20 to 40 cc. has been recommended. The latter is of greatest benefit when given early in the disease.

The University of Minnesota Human Serum Laboratory located at the University Hospital has a supply of this serum ready for distribution.

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Further Observations on Allergy to Smuts

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SINCE 1924 the accumulated evidence of many observers has shown that fungi play an important role in allergy. The common air molds, yeasts, pathogenic skin molds, grain smuts and rusts have all been mentioned as factors.

Stakman¹ and his coworkers made observations as early as 1923 on the prevalence of spores of the upper air with particular reference to smuts and rusts. Cadman² in 1924 reported cases of allergy due to grain rust. Wittich and Stakman³ reported a case of grain smut respiratory allergy of twenty years' duration, when the patient was not only sensitive to the grain smuts, but the offending smuts were present in his sputum. The patient was hyposensitized with smut extracts to apparently a complete clinical recovery. The author observed that smuts frequently augmented the severity of the grain sensitive patients.^{4,5} Recently Harris^{6,7} reported 13 cases of seasonal allergic rhinitis and asthma where carefully controlled experiments suggested grain dust and grain smut as definite etiology. He also indicated a possible close antigenic relationship between the grain dust and the grain smuts. Waldbott and Ascher⁸ recently observed seven patients in the Detroit area "who had symptoms exclusively during the rust and smut season" and twelve "who suffered definite exacerbations at the time." They obtained stronger skin reactions with rusts than with the smuts and believe that rusts are a more important antigenic factor in their region.

Smuts, rusts and the common air molds were very prevalent last season, owing to the normal or excessive moisture and favorable temperatures. Smuts were observed in large numbers before, during and following the grass and weed pollinating seasons until frosts and snowfall. Some patients with hay fever and asthma were observed during the seasons of 1937 and 1938 who showed severe symptoms when the pollen counts were very low, and they had received adequate treatment for their pollen allergy. Recent systematic studies of the air content during the hay fever season showed smuts in many localities to be far in excess of the pollens and common air molds.

BIOLOGY OF SMUTS

Smuts are obligate parasites. They are minute thread-like colorless plants or mycelium, and with few exceptions enter the young seedling plants, establishing themselves in the growing point of the plant, and grow up with the "host," remaining invisible until the heads of grain appear. These florets are replaced and partially or wholly destroyed by masses of dark-colored spores called smut. Most serve to propagate by getting on or in the seed, where they start to grow again with the grain when it is planted. The stinking smuts of wheat may overwinter on the seed or in the soil. In the Pacific Northwest this soil-borne inoculum is a serious problem

in the propagation of smut. Corn smut may overwinter in soil; in silage; it grows saprophytically in soil and manure piles and may attack any above-ground growing part of the plant so that the galls usually represent localized infections. These smut masses are disseminated by the winds and are chlamydozoospores from which promycelium develops which in turn gives rise to sporidia. These give rise to the mycelium which enters the plant. Smuts are grouped into two families, of which there are over a hundred species. There may be two or three species for a single cereal, as there is for wheat, barley, rye, rice, oats, corn, sorghum, wild and cultivated grasses, as well as common plants like the onion, spinach and sunflower. Figure 1 shows a few of the commoner smuts of wheat, corn, rye, oats and barley together with one of rust and a few granules of ragweed pollen taken at the same magnification for comparison. The nitrogen content of several of the common smut spores is shown compared with that of ragweed and grass pollens in table I. The nitrogen content of smutted grain dust is proportionate to the amount of smut which it contains. As the smuts are obligate parasites, it is reasonable to expect some of the grain substance to be contained in its corresponding smut, and there is evidence that some synthesis does take place. This may account for the cross reactions with mill dust, as the more smutted the mill dust the more severe the symptoms. Guinea pigs sensitized with alum precipitates of grain dusts and "shocked" with their corresponding smut would indicate an immunologic relationship.¹² Their antigenic relationship has also been shown by the Dale test. Grain smut allergy is not to be confused with mill dust allergy. Patients have hay fever and asthma who are sensitive to smuts and who are not sensitive to mill dust unless it contains its corresponding smut.

PREVALENCE AND DISTRIBUTION OF SMUTS

Further observations were warranted to determine the relative clinical importance of grain smut allergy, especially in the grain and milling centers of the Middle-west and Northwest.

Smuts occur wherever there are grains and grasses, but are most numerous in areas where conditions favor their infestation. The Middle-west and the Pacific Northwest are areas where smut is produced in enormous quantities. However, they are numerous at certain times in other states, especially the Southern and Southwestern states.

It is estimated that wheat smut alone reduces the yield of that grain annually about 25,000,000 bushels and the dockage for smutty grain totals \$10,000,000 each year.¹⁰

The grain mold spore count was extremely high during the summers of 1935 and 1936 in this region because of periods of drouth, low humidity and high dry winds.

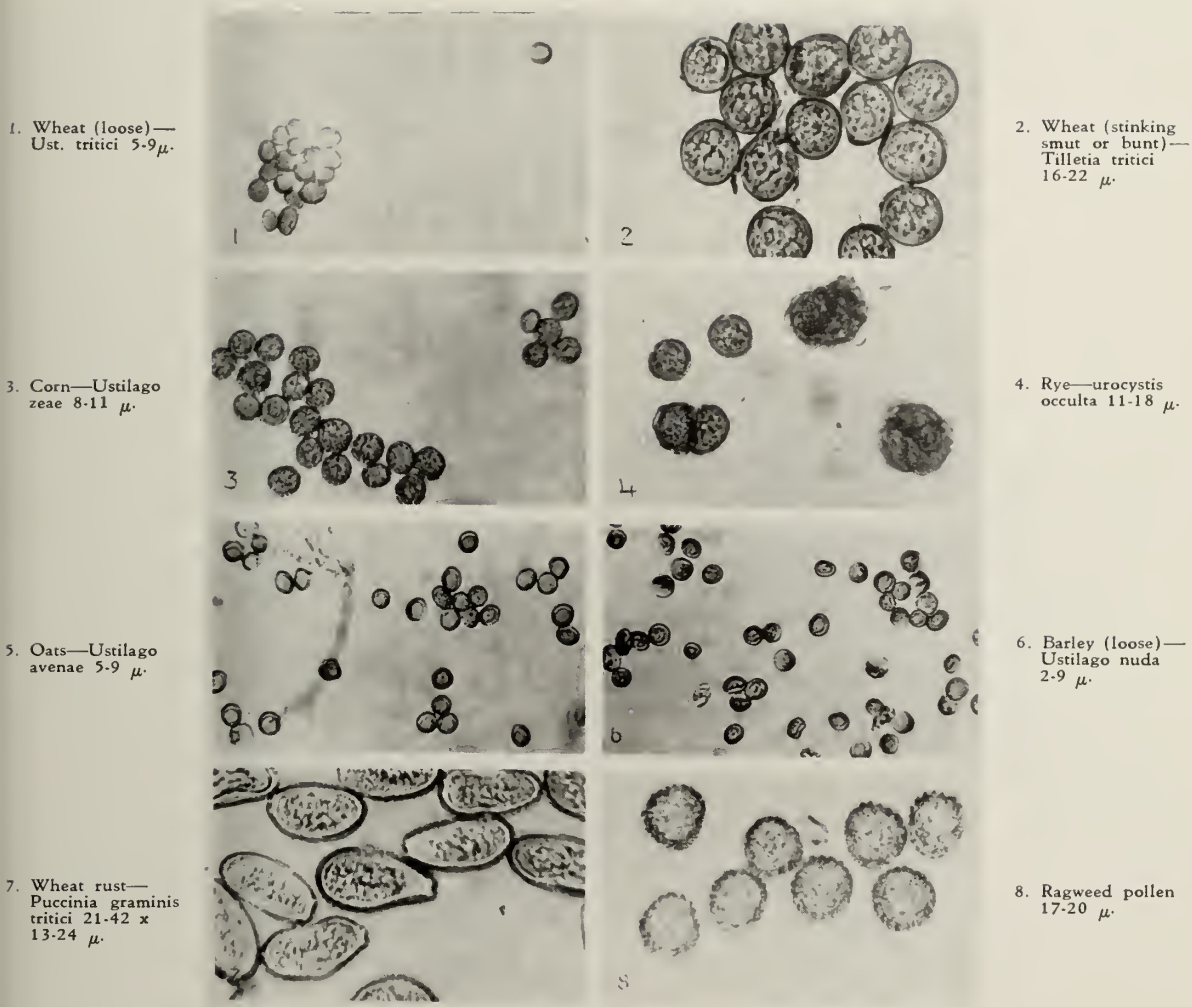


Fig. 1. Photomicrograph of grain smut spores. Wheat rust and ragweed pollen shown for comparison. Magnified 430 diameters. A detailed description of spores can be obtained from Heald's "Manual of Plant Diseases"¹⁰ or Steven's "Plant Disease Fungi."¹³

According to Stakman,³ during the season of 1935, corn smut in certain areas reached a million spores per square foot in 24 hours. Heald¹¹ states that spores of the stinking smuts or bunts of wheat may be numerous in mill dust, as a single smutted wheat kernel may contain 6,000,000 to 9,000,000 spores. He also estimated that during the harvesting or threshing time in the wheat-growing district of the Palouse country of eastern Washington, 5,000,000 may fall on each square foot of soil. The "smut showers" begin in August, reach their maximum about the middle of September and then gradually subside.

Minnesota plants approximately 10,000,000 to 15,000,000 acres of corn, oats, barley and wheat annually, while the Dakotas combined plant that much wheat alone.¹³ Hennepin County, in which Minneapolis is located, planted 11,000 acres of wheat and twice as much corn. The heads of wheat blossom in Minnesota usually from June 22 to June 27, and the heads appear ripe after that, so that the harvesting time for this winter grain is

Percentage of Nitrogen by Weight of Grain Smuts and Pollens (Kjeldahl Method)

Grain Smuts	% of N ₂ by Weight	Pollens	% of N ₂ by Weight
Wheat— Covered smut (stinking smut) <i>Tilletia tritici</i> <i>Tilletia levis</i>	3.20%	Timothy	5.35%
Loose smut— <i>Ustilago tritici</i>	3.80		
Oats— Covered smut— <i>Ustilago avenae</i> Loose smut— <i>Ustilago levis</i>	2.63	June Grass	4.85
Rye smut— <i>Urocystis occulta</i>	3.05	Short Ragweed	4.90
Corn smut— <i>Ustilago zeae</i>	2.68	Giant Ragweed	5.11

between July 17 and July 23. At this time the infected or smutted heads commence to throw off the black smut dust in countless numbers. The spores are widely dis-

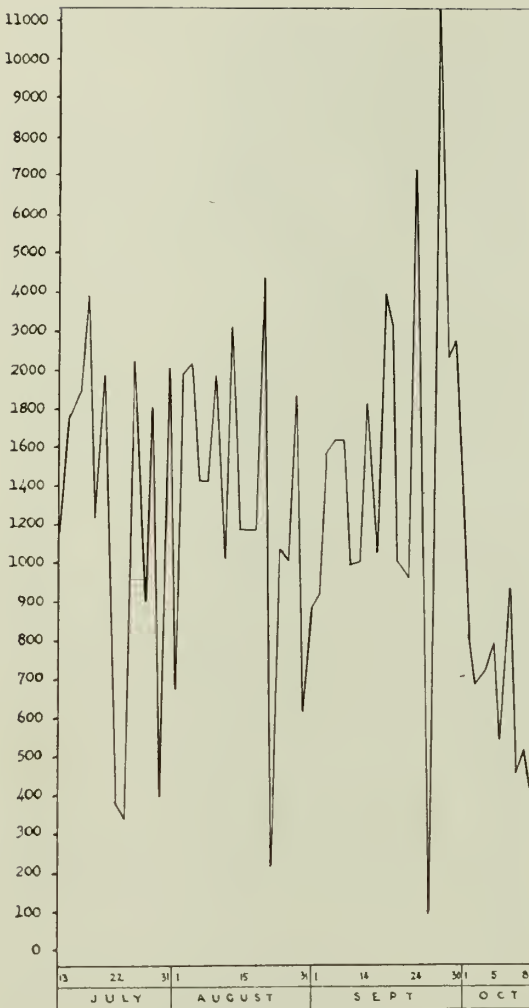


Chart 1. Daily smut spore count from July 13 to October 8, 1938, at Wayzata, Minnesota. The figures on the scale represent the number of smut spores found on a slide area of 1.8 sq. cm.

seminated by the high dry winds which are quite common.

Smut appears in large amounts near the grain storage centers in Minneapolis. The various grains are shipped near the city and samples sent for inspection. Over 3,000 workers about the grain exchange are engaged in inspecting, sorting and conveying the grains, while thousands of workers are employed in the flour mills and grain elevators. Disastrous mill dust explosions have occurred. Most of the buildings are old and contain a great deal of mill dust and many molds. Smut spores are extremely combustible when beaten up into a dust because of their oily nature. Cases of contact dermatitis are seen, as well as the atopic forms of skin allergy, perennial rhinitis and asthma, not only among those handling the grains but those employed in nearby offices. Slides exposed for 24 hours inside of the offices within six blocks of the grain exchange showed numerous grain

smuts, rusts and other molds. Charts 1, 2, 3 and 4 show the daily total smut count of four representative stations in Minnesota from July 1 to October 31, 1938. These counts were made through a fertile grain belt in Minnesota extending from the Dakota line eastward. Chart 5 is a comparison of the smut counts for 1937 and 1938 at one of the stations.

During late June and early July the loose smut of winter wheat, barley, oats and grasses are in the air. The harvesting periods of August and early September free the stinking smuts or bunts of spring wheat. After late July the corn smut appears. In the fall, when the corn is stacked and allowed to stand in the fields, the large smut balls are broken up and disseminated so that the corn smut spores are found in large numbers until snowfall. A survey made in 1937 showed a corn smut shower of 174,000 spores per 1.8 sq. cm. surface area during a high west wind following several killing frosts.

Smut, therefore, appear in large numbers during and between the grass and weed pollinating seasons. They predominate numerically the common air molds appearing at the same time. It would seem that they are responsible, in part at least, as well as the common air molds, for some of the symptoms of hay fever and asthma occurring between and after the pollen seasons and for otherwise unaccountable exacerbations during the pollen seasons.

SMUT SPORE COUNTING

Smut spore counting and identification is relatively difficult, compared with that of the common air molds. It is necessary to use a magnification of nearly 500 diameters, and this of course must be taken into account when estimating the accustomed unit of 1.8 square centimeters used for pollens.* The gravity slide method of collecting the molds was used. Slides, very thinly coated with vaseline, were exposed for 24 hours at "ground level" at four stations westward from Minneapolis to the Dakota line. These districts take in a very fertile corn, barley, oats and wheat belt.

CLINICAL OBSERVATIONS AND METHODS

All of the smut spores used in these observations were furnished by the Department of Plant Pathology of the University of Minnesota. They were sifted through a motor driven shaker mill-sifter with a five drawer compartment of graduated meshed wire gauze and silk cloth, the finest being 200 mesh per square inch. The chlamydospores were then checked microscopically. Cultures of smuts resulted only in the growth of mycelium and sporidia which are not suitable as antigens.

For intradermal testing, .03 to .05 cc. of a 1:500 or 1:1000 dilution of a 3 per cent extract of the smut spores in buffered isotonic dextrose solution with 0.5

*For uniformity this method was used in counting the smuts that appear in the accompanying charts. However, there is much need for the universal adoption of a correct standard unit of surface area to be counted in estimating the number of microscopic particles of varying dimensions settling by gravity on a given area of surface in 24 hours. Smut spore identification and counting is made easier by carefully placing a drop of cedar oil on the exposed specimen slide and gently placing a 25 mm. cover slip so that its edges correspond with that of the ordinary slide and the spores are not disturbed. This prevents the dispersion of light and the spores are more clearly defined.

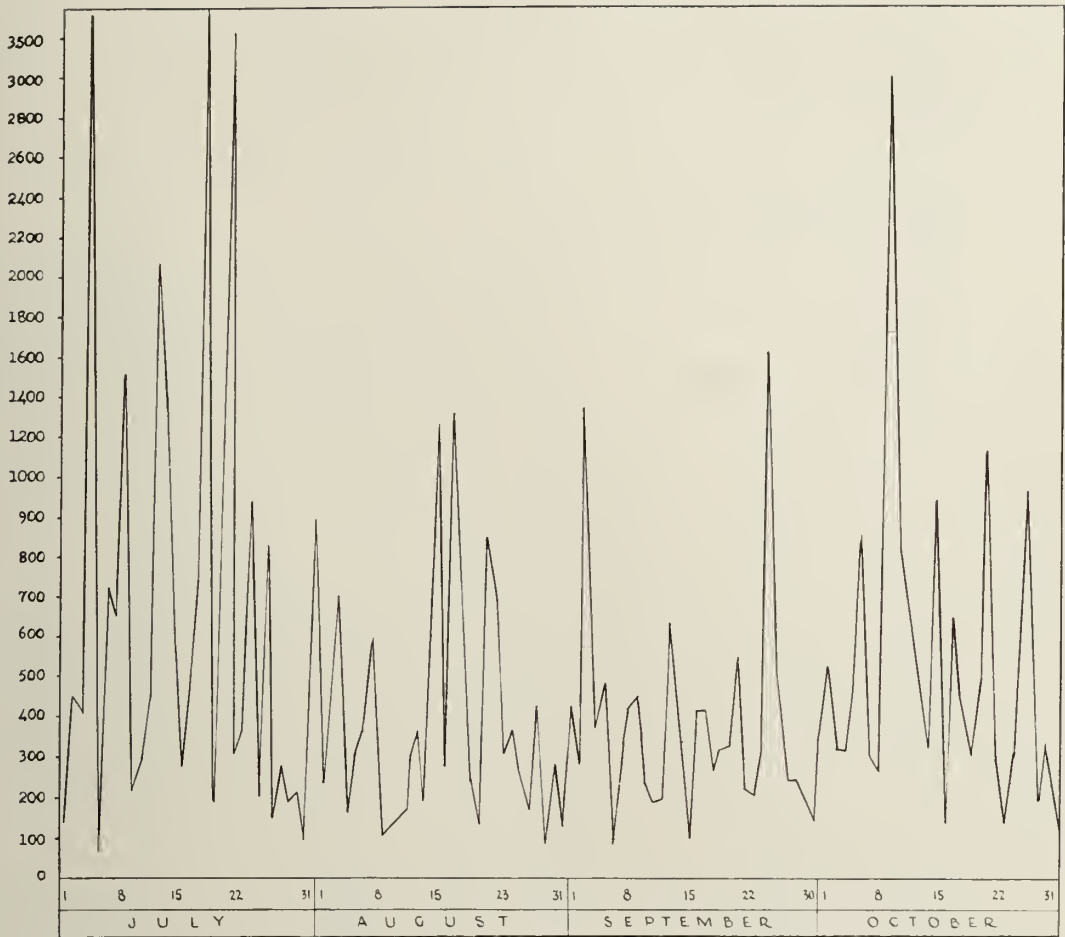


Chart 2. Daily smut spore count from July 1 to October 31, 1938, at Anoka, Minnesota. Other data as under chart 1.

per cent phenol was used. Skin tests were done by the scratch and the intradermal method. Together with smut testing, routine common air molds were used as well as yeasts, pollens, animal emanations, dusts and foods—especially the grains and various mill dusts.

Of 105 patients of respiratory allergy whose history warranted testing for fungi, 52 had asthma, 26 had hay fever and 27 had both. Fifty-six per cent were sensitive by skin tests to the pollens, 42 per cent to animal emanations and miscellaneous inhalants, 35 per cent to foods, 23 per cent to the common air molds, 23 per cent to smuts and 10 per cent to yeasts.

Results of 24 patients showing skin sensitivity to smuts are shown in table II. The clinical histories, skin reactions, successful passive transfers, as well as the symptoms produced by blowing smut powder into the nostrils, suggested that the first eight cases in the table represented primary smut allergies. The majority of cases, however, showed equal or greater sensitivity to pollens, common air molds or other inhalants, so that the value of the smut allergens is very difficult to determine.

COMMENT

One must keep in mind that smuts grow hand in hand with the weeds, grains, grasses, etc., that the ni-

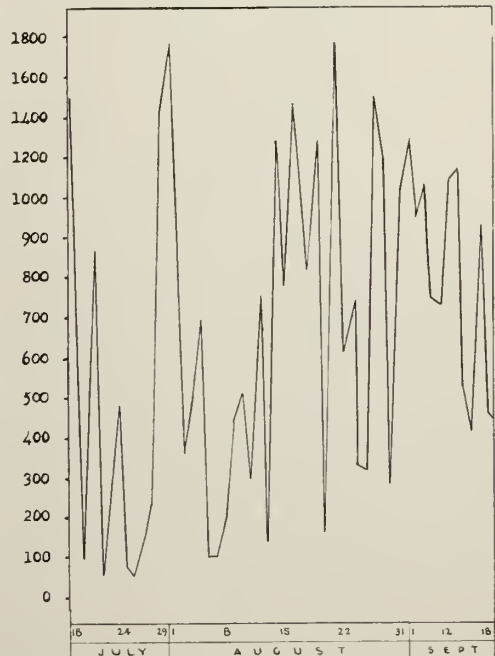


Chart 3. Daily smut spore count from July 18 to September 19, 1938, at Olivia, Minnesota. Other data as under chart 1.

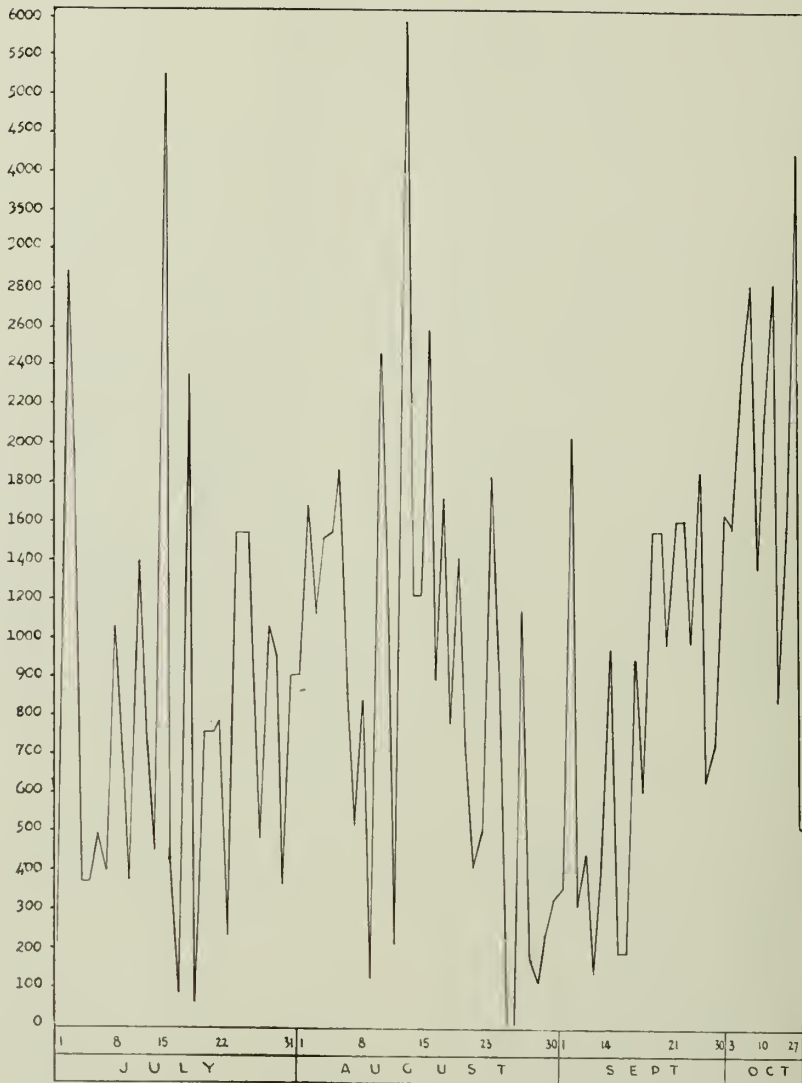


Chart 4. Daily smut spore count from July 1 to October 27, 1938, at Morris, Minnesota. Other data as under chart 1.

trogen content nearly equals that of the grass and weed pollens, that many being smaller are more widely and highly distributed by the air currents, and that their smaller size compared with *Alternaria*, is made up by their superior number in the air in the grain growing areas.

In smut areas, pollen allergy is complicated by grain smut sensitivity depending upon the flora and crops together with other conditions of that particular section.

During a season of luxuriant plant growth, as in 1937, when as high as 30,000 units of ragweed antigen were given as hyposensitizing doses, patients showing smut sensitivity did not show complete recovery until smut extracts were used. This and other factors point to the importance of smuts as a clinical cause of hay fever and asthma in grain growing sections.

I am impressed by the fact that in our area favorable conditions for producing grain smut sensitivity prevail because of the daily handling and storage of grain. There is adequate contact and sufficient antigenic stimulation, augmented by the non-specific factors: wind and dust.

SUMMARY

1. A systematic survey was made to determine the prevalence of grain smuts, rusts and common air molds, in relation to pollens at various representative areas in Minnesota. Grain smuts were shown to predominate and occurred in larger numbers, before, during and after the ragweed pollinating season.

2. Smuts have been proven to possess a definite excitant of hay fever and asthma.

TABLE II. RESULTS OF 24 PATIENTS SHOWING SKIN SENSITIVITY TO SMUTS

CASE HISTORY	OTHER REACTIONS	WHEAT			OAT	BARLEY	RYE	CORN	SORGHUM		MIL- LET
		Bunts		loose	(combined)	(combined)			Sphacelotheca sorghii	Sphacelotheca cruenta	
		Tilletia tritici	Tilletia levis	Ustilago tritici	Ustilago avenae	Ustilago levis						Ustilago hordei	Ustilago nuda	Ustilago zeae	Ustilago crameri
1. L. S. Male, 48, electrician. Asthma when employed around the flour mills.	Pollens: negative; Common Air Molds: negative	+++	++	+	+	+	+	++	++	+	
2. A. B. Male, 55, clerk flour mill office. Perennial asthma. Slides exposed at office show high smut count.	Ragweed +++ Mixed Grain Mill Dust ++ Air Molds: negative	+	+	+	-	+	++	-	-	-	
3. F. D. Male, 45, Railway mail clerk. Severe asthma in summer only when on route through grain belt.	Pollens: negative Mixed Grain Mill Dust +++ Air Molds +++	++++	++++	+++	++++	++++	-	++	+	-	
4. W. H. Female, 42, housewife, suburb. Severe seasonal hay fever—no response to adequate pollen therapy. Complete relief after smut hyposensitization.	Ragweed ++++ Mixed Grain Mill Dust ++ Air Molds +	++++	++++	++++	+++	+++	++++	++++	+++	+	
5. D. M. Male, 40, clerk in the milling district. Asthma from middle of July long after frost.	Pollens: negative Mixed Grain Mill Dust ++ Air Molds ++	++++	++++	++++	++++	+++	++++	+++	+++	+	
6. D. F. Male, 30, clerk in the milling district. Hay fever early July to snowfall.	Ragweed ++++; Mixed Grain Mill Dust ++++; Air Molds +	+	+	+	+	-	+++	++	-	-	
7. E. W. Female, 20, student. Farming district. Asthma worse in Summer and Fall. General reaction following rye smut intradermal 1:500.	Ragweed ++++ Grain Mill Dust Mixed +++ Air Molds +	+++	++++	+++	+	+	++++	+	-	-	
8. S. S. Male, 44, feedmill operator. Works with oatfeed. Perennial asthma that is worse in the summer.	Pollens: negative; Mixed Grain Mill Dust ++; Air Molds: neg.	+	+	+	++++	-	++	-	+	+	
9. J. M. Male, 30, brewery employee. Perennial rhinitis.	Pollens: negative; Mixed Grain Mill Dust ++; Air Molds: neg.	-	-	-	-	++	+	++++	++	-	
10. G. G. Male, 40, clerk in the milling district. Perennial asthma. Seasonal hay fever.	Ragweed ++++; Mixed Grain Mill Dust +; Air Molds +++	+	+	+	+	++	-	++	++	+++	
11. S. B. Male, 36, country store. Perennial asthma.	Ragweed ++; Mixed Grain Mill Dust ++++; Air Molds +	+	+	-	++	++	-	+	+	-	
12. A. D. Female, 34, teacher. Fall hay fever. Perennial rhinitis.	Ragweed ++++; Mixed Grain Mill Dust ++; Air Molds: neg.	+++	+++	+++	++	-	+	+	-	-	
13. R. E. Male, 50, flour mill operator. Perennial asthma and rhinitis. Soy bean sensitive.	Pollens: negative Mixed Grain Mill Dust +++ Air Molds +	+++	+++	+++	+++	++	++	+	+	-	
14. H. G. Male, 19, student. Lives in suburb surrounded by millet fields. Perennial asthma and seasonal hay fever.	Ragweed +++ Common Air Molds ++++	+++	+++	++	+	-	-	++++	++	+++	
15. J. L. Male, 30, clerk in the milling district. He suffers from seasonal hay fever.	Ragweed ++++ Mixed Grain Mill Dust +++ Air Molds ++	+	+	+	+	++	++++	+	+	++	
16. J. M. Female, 37, lives near grain elevator. Hay fever and asthma during Summer and Fall.	Ragweed +++ Mixed Grain Mill Dust +++ Air Molds +	+++	++	++	++	-	++	+	++	-	
17. P. S. Female, 24, clerk in the milling district. Perennial asthma. Seasonal hay fever.	Ragweed ++++ Mixed Grain Mill Dust: negative Air Molds +	+++	+++	++	+	-	-	++	-	-	
18. F. W. Male, 45, rural contractor. Perennial asthma.	Pollens: negative Mixed Grain Mill Dust +++ Air Molds ++++	-	+	-	+	+	++++	+++	-	-	
19. E. W. Female, 45, housewife, residing near the grain elevators. Perennial rhinitis and asthma.	Pollens: negative Mixed Grain Mill Dust ++ Common Air Molds +	++	+	++	++	++	-	-	+++	-	
20. R. R. Female, 39, farmer's wife. Perennial asthma and Fall hay fever.	Ragweed ++++; Mixed Grain Mill Dust ++++; Air Molds ++	+++	+++	+++	++	-	+	-	-	+	
21. M. R. Female, 19, farmer's daughter. Perennial rhinitis and asthma.	Grasses ++++ Mixed Grain Mill Dust ++++ Air Molds +++	++	++	++	++	+++	++	-	-	-	
22. J. S. Male, 10, resides in rich grain growing section. Hay fever, Fall type. Asthma from June until December.	Ragweed +++ Mixed Grain Mill Dust ++++ Air Molds +++	++++	++++	++++	-	+	+++	-	-	-	
23. F. W. Male, 20, flour mill night watchman. Perennial asthma. Seasonal hay fever.	Ragweed +++ Mixed Grain Mill Dust +++ Air Molds ++	+++	+++	++	-	-	-	-	-	-	
24. G. A. Male, 31, drug clerk. Seasonal hay fever. Perennial asthma.	Ragweed ++++ Flaxseed ++++ Air Molds ++++	+++	+++	+++	++	+	+	+++	-	-	

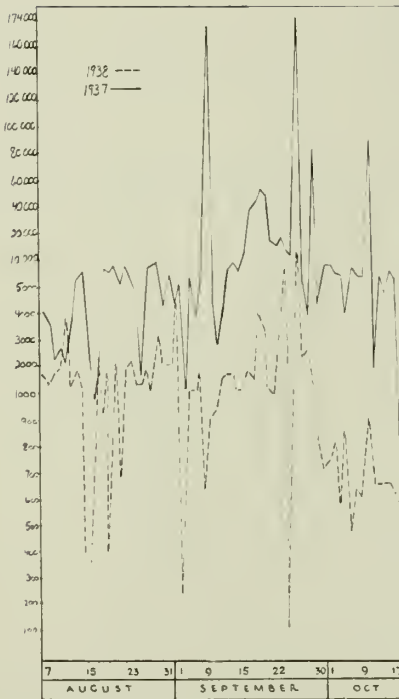


Chart 5. A comparison of the smut counts for 1937 and 1938 at Wayzata, Minnesota.

3. A clinical study of grain smut sensitivity compared with ragweed pollen and the common air molds of 105 patients with respiratory allergy was made. Smut sensitivity was considered the most important in eight cases of respiratory allergy.

4. Evidence is obtained which would indicate an immunologic relationship between the smuts and their corresponding hosts, the grains.

5. Sufficient evidence has been shown that a more systematic survey of air-borne fungi, in the various sections of the country, must be made to arrive at any definite conclusions.

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Infectious Equine Encephalomyelitis*

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AT the conference held in January, 1938, papers and discussions on sleeping sickness in horses were presented by Dr. Carl Ten Broeck, director of the Rockefeller Institute for Medical Research and Dr. Gochner of the Pathological Division of the Bureau of Animal Industry, United States Department of Agriculture. They furnished the latest information and review of the studies and investigations from a scientific standpoint of this disease at that time. There were other men on the program who had had practical experience in the control and treatment of the disease, who reviewed the history of outbreaks, the symptoms,

*Presented before the Minnesota Horse Breeder's Association, January 18, 1939.

the pathology and the results of the then known preventive and therapeutic treatments of the disease. During the past year, investigation and research by the workers in Dr. Ten Broeck's laboratory, the laboratory of the Pathological Division of the Bureau of Animal Industry and in other laboratories, have disclosed some very valuable information relative to the importance of this disease and its control. The most important and serious disclosures as a result of researches conducted by the various laboratories during the year is the appearance of this disease in the human family; thus disclosing that it is not only an economic problem to the horse owners, but that it may be a serious human health problem. They disclose that the virus causing encephalo-

myelitis in horses is the same virus that produces outbreaks of some types of encephalitis in man and encephalomyelitis in ring-necked pheasants and pigeons.

I will try in this paper to furnish a review of the reported scientific investigations and studies in the past year of the disease, the preventive measures to control it and to keep the incidence and mortality as low as possible. I trust that as a result of the knowledge the scientists now have that further research will determine the reservoirs that keep the virus alive in a territory from one year to the next, thus furnishing new measures by which the disease can be controlled and eliminated.

The data relative to the incidence or appearance of this disease throughout the United States during the summer and fall of 1938 was presented at the meeting of the United States Livestock Sanitary Association in Chicago on December 1, 1938 by Drs. Shahan, Giltner and Schoening. They report that in 1935, there were a total of 23,000 cases of this disease reported in the United States. In 1936, a relatively dry year, which for this or other unknown reasons was apparently unfavorable toward the spread of the disease, only about 4,000 cases were reported. In 1937, the most severe epizootic ever experienced in this country occurred, about 170,000 cases being reported. They stated they have received to date reports from the various states of a total of 79,606 cases during the 1938 outbreak. An average mortality rate from 1935 to and through the outbreak of 1937 was maintained at about 25 per cent of the affected animals. The report of the 1938 outbreak shows a decline to about 21 per cent in the mortality of the sick animals. There is no doubt but that the Federal Bureau of Animal Industry will receive reports disclosing that there were materially more cases than the 79,000 cases reported to them on December 1st. The authors stated that on the basis of the information available at that time, they conclude that in 1938 there was less than one-half as many cases occurring throughout the United States than in the summer and fall of 1937. They further report there was a marked decrease of the disease in the areas that were affected in 1937 but that elsewhere the disease spread. They state that Connecticut, Illinois, Kentucky, Maine, Massachusetts, Michigan, Ohio and Rhode Island in which it had never previously appeared or if it had appeared, it was limited to only sporadic cases, suffered more or less serious losses in 1938.

Further research during the past year has confirmed the earlier findings that we have two distinct diseases. The form that appears in the east is due to the eastern strain of virus and is much more virulent than that which has appeared in the western sections of our country that is due to the western strain of virus. The mortality in horses that contract the eastern type of the disease ranges from 80 to 98 per cent. The western type is not as fatal and the percentage of deaths in animals has materially lessened since the outbreak in 1935. This, without doubt, is due to the fact that in the territory where the disease has existed in former years, the horse owners, through experience, have called their veterinarians immediately when the horse becomes sick and

with proper care and treatment the percentage of deaths has been decreased to about an average of 21 per cent fatality in the affected horses during the outbreak of 1938. The outbreak due to the eastern virus is limited to the states along the Atlantic seaboard and has not appeared west of the Appalachian and Blue Ridge Mountains.

The difference between the two viruses that produce the two distinct types of the disease is that they do not "cross immunize." An animal that has recovered from the type due to the western strain of virus is immune to that particular virus at least for a period of one year. Dr. Schoening reports that the animal can be reinoculated artificially with the western virus and will not contract the disease whereas if inoculated with the eastern virus, it promptly becomes sick and dies. This is true of the eastern virus, an animal that has recovered from the eastern type can be reinoculated with the eastern virus and will not become sick, but if artificially inoculated with the western type, contracts the disease and dies. The authorities and investigators have shown that it is very important in undertaking to vaccinate horses that the proper type of vaccine be used in an area. It would not do to use an eastern type vaccine in a territory where the western virus is operating as no immunity could be expected from such treatment. The Bureau of Animal Industry reports that during the past year and also in previous years they have been paying particular attention to the location of the disease as it appeared in the various states with particular reference to determining the type that occurred in the state as the two different types of virus have remained quite distinct. The western type of the disease has remained in the west although it is slowly moving eastward and the eastern type is limited to the states along the Atlantic seaboard. During the past year fourteen strains of virus were recovered and sent to the United States Bureau of Animal Industry's laboratory and studied with the result that the eight strains of virus recovered in the 1938 outbreak from Massachusetts, North Carolina and Florida only proved to be of the eastern type, and six strains from Kansas, Minnesota and Illinois were found to be of the western strain of virus.

Drs. Shahan, Giltner and Schoening report, that since the identification by Drs. Meyer, Haring and Howitt of the causative agent of the disease in the western part of the United States and by Ten Broeck and Merrill, and Shahan and Giltner of an immunologically distinct virus in cases along the Atlantic seaboard, infectious equine encephalomyelitis has been diagnosed in 41 of the 48 states. Only nine states, namely, Alabama, Georgia, Mississippi, New Hampshire, New York, Pennsylvania, Tennessee, Vermont and West Virginia report freedom from the malady in 1938. Since 1931 actual recovery of the virus has been accomplished in 27 states. The eastern strain of virus has been typed in outbreaks of the disease in Delaware, Georgia, Maryland, New Jersey, North and South Carolina and Virginia. During the year 1938, outbreaks in Florida and Massachusetts were also identified as due to the eastern strain of virus. Viruses from California, Idaho, Iowa,

Montana, Minnesota, Nevada, North and South Dakota, Texas and Utah prior to the outbreak in 1938, had all been determined to be of the western type. During the summer of 1938, viruses obtained from cases in Kansas and Illinois were found to be due to the western type virus. Viruses obtained from the states of Colorado, Indiana, Louisiana, Nebraska, Ohio and Wisconsin have been disclosed to be of the western type either in the 1938 outbreak or in previous years, but none of these have been specifically typed according to the report of the Bureau. A clinical diagnosis only of the disease has been made in nine states, viz., Arkansas, Kentucky, Maine, Mississippi, Missouri, Oregon, Rhode Island, Washington, and Wyoming. The clinical diagnosis has been substantiated by histopathological examinations of Arizona, Connecticut, Michigan, New Mexico, and Oklahoma cases.

It is very important when an outbreak occurs in a new territory that the actual demonstration of the existence of the type of virus should be determined. While clinical diagnosis and a histopathological examination of the brain may be accurate enough for the needs of the practicing veterinarians and owners of horses in territories where the type of the disease has been positively determined, to control the treatment of the disease, in view of the fact that we know positively there are two distinct types of virus, we should have knowledge of the type of the causative virus that is producing the outbreak. The United States is but one of several countries in which outbreaks of the disease have occurred simultaneously involved in severe epizootics of infectious equine encephalomyelitis. The provinces of Saskatchewan, Manitoba, and Ontario, in Canada, have experienced more or less severe epizootic outbreaks. Several South American countries, Argentina, Brazil, Peru, Chile and Venezuela have also suffered from this disease as well as Russia, Japan and India. In 1936, Colonel Kelsner of the United States Army reported recovery of the eastern type virus from a horse in Panama. This animal had been shipped from Nebraska some years previous to contracting the disease.

The causative virus in Argentina and Peru is reported to be immunologically indistinguishable from the western type of this country. Howitt's immunological studies in guinea pigs also differentiated the Russian type from either the eastern or western North American type. Howitt has concluded that both American viruses are distinct from Borna disease that is responsible for outbreaks in Europe.

In the December 2, 1938 issue of *Science*, Doctors Beck and Wycoff, Pearl River, New York, have an article entitled "Venezuelan Equine Encephalomyelitis." They state a severe epidemic of equine encephalomyelitis occurred this year in the United States and Canada and that a similar disease has now broken out in northern South America. They received brains of animals dying of this disease from Venezuela. Examination disclosed that the virus is similar and the symptoms resemble those of eastern encephalomyelitis but that the strain is immunologically different from either the eastern or the western virus that are present in North America. They

state, however, that their investigation is not sufficient to settle this question and suggest that there may exist a relationship between our eastern strain of virus and the Venezuelan strain.

Further studies and investigations of the disease in laboratories of this country have disclosed that in addition to the horse, man, guinea pig, rats, mice, rabbit, monkey, pigeon, cat, dog, goat, duck, goose, hawk, vulture, stork, ground squirrel, turkey and guinea fowls are susceptible to inoculations with the western virus. The calf, sheep, ring-necked pheasant, quail, pig and European hedgehog are susceptible to inoculations with the eastern type of virus.

Drs. Shahan, Giltner and Schoening report that during October, 1938, a disease amongst wild duck in the state of Montana occurred where sleeping sickness of horses was prevalent at the time. The descriptions of the symptoms were suggestive of encephalomyelitis which they have often seen in experimentally inoculated birds. They received a few of the dead birds, examined their brains but they did not succeed in disclosing the virus, but their pathological studies of the brain revealed alterations suggestive of virus disease, the disease terminated rapidly and they were unable to obtain further specimens for examination. They state that the pathological findings of the examination of the brain were also suggestive of encephalomyelitis and that a study of this disease should be followed up when other outbreaks appear. The tick has been disclosed as capable of transmitting artificial infection from the guinea pig to the ground squirrel or gopher.

Investigations have shown that the virus circulates in the blood of a horse only during the first stages of the disease and may provide the infection for the spread of the disease, however, all studies to date have failed to show that the horse is the carrier. Large numbers of horses are shipped from the western to the eastern markets and yet the western type of the disease has not been transmitted and does not occur in the east. Antibodies have been recovered in the blood of horses that have recovered from both types of the disease. Studies have disclosed that mosquitoes and possibly other arthropods must be considered as incubators and potential carriers of the infection, however, to date studies have failed to disclose infection in mosquitoes or other blood-sucking insects under field conditions.

Dr. Ten Broeck in a talk on Infectious Equine Encephalomyelitis at a conference in Philadelphia this month stated he has found antibodies of the disease in farm fowls such as chickens and turkeys, in territory where outbreaks appeared in horses, that the disease has occurred in nature in ring-necked pheasants and pigeons and that the outbreaks occur in horses simultaneously at points which are considerably distant from each other. He further stated that as a result of their findings there is a possibility that wild birds are the disseminators of this disease. He further stated that he is of the opinion the eastern type of the disease only occurs in the salt water and marsh regions along the Atlantic seaboard.

Further laboratory studies have disclosed that there are eight species of mosquitoes that can carry the infec-

tion. Dr. Wm. A. Riley, chief, division of entomology, University of Minnesota, in a paper presented to the Minnesota Sanitary Conference November 4, 1938, states: "To date we have proof that at least eight species of Aedine mosquitoes are able to take up, incubate and convey, under laboratory conditions, the virus of equine encephalomyelitis. Of the eight species listed, *Aedes vexans*, *Aedes dorsalis* and *Aedes magromaculis* occur commonly in Minnesota. Overwhelmingly dominant in most parts of the state is *Aedes vexans*, a marsh-breeding species which is noted for its migratory habits. *Aedes vexans* deposits its eggs in low-lying ground where they may lie dormant not only for the remainder of the year but even for several years, until heavy rains create temporary pools which persist until the development cycle is completed. In warm weather this period may be as brief as four or five days. On emergence, the adults readily migrate for a distance of 15 miles or more."

During the past summer, investigations have disclosed that infectious equine encephalomyelitis has occurred in nature in the ring-necked pheasant and also in pigeons. An article entitled "The Occurrence in Nature of Equine Encephalomyelitis in the Ring-Necked Pheasant" by Tyzzer, Sellards and Bennett of the Department of Comparative Pathology, Harvard University was published in the November 25 issue of *Science*. They report that three pheasants were received for diagnosis on October 6, 1938 from a locality in Connecticut. These birds had been on range and were found in a partially paralyzed condition and died before being shipped. The person who sent the birds reported that he had found dead wild birds as well as pheasants following the hurricane of September 21. The examinations of the brains disclosed no gross lesions with the exception that the brain was soft. This was attributed to postmortem change, the birds having been in transit for three days. White mice were inoculated intracerebrally from the brains. All of the mice were dead on the fourth day. A fourth pheasant was found sick in the same region and the laboratory received the carcass on October 18. Mice were inoculated and died in four to five days. This strain was carried through a second passage in the mice. Serum of a rabbit that has been immune to eastern equine encephalomyelitis gave complete protection to mice against 100,000 minimal infective doses of the pheasant strain. Tests were made of the susceptibility of other birds to the pheasant's virus, and they were successful in transmitting the disease to quail and Rhode Island Red chicks. Experiments disclose the susceptibility of many birds to certain strains of encephalomyelitis; notably the pigeon, a species of vulture, the stork, duck, goose, European blackbird and the common harrier of Europe. They make the following summary that is very interesting: "The recognition of a series of cases of equine encephalomyelitis in pheasants adds valuable information concerning the distribution of this disease, and the designation 'equine' becomes an unfortunate misnomer. Indeed, it may be seriously questioned whether the horse or other domestic animals play any essential role in assuring the perpetuation of this dis-

ease. The present demonstration of the natural occurrence of the infection in game birds and the experimental evidence obtained by Remlinger and Bailly of the susceptibility of migratory birds to certain strains of encephalomyelitis suggest an easy mode for the wide distribution of this virus. A search for spontaneous infection in migratory birds is indicated. Extensive surveys will be required in order to know just how widely the infection is spread in nature. It may be only under accidental circumstances or when the infection rises to a certain level that it overflows and becomes a serious problem as regards the horse and even the human being."

"A Fatal Disease of Pigeons Caused by the Virus of the Eastern Variety of Equine Encephalomyelitis" is reported in the December 9 issue of *Science* by Fothergill and Dingle of the Harvard Medical School. They report that as a part of their investigation of the human disease, during the recent epidemic of equine encephalomyelitis in Massachusetts, it became of importance to consider the possibility of other host reservoirs of the virus. A number of breeders of pigeons residing in the area where the horse disease existed, reported they had suffered unusual losses in their special breeding stock and also of the common domestic pigeon, the species that is so numerous in our cities. On September 20 they received a dead pigeon from one of the breeders whose residence is adjacent to a farm on which two horses had died. The virus of the eastern variety of encephalomyelitis was recovered from the brain of the pigeon which had spontaneously contracted the disease.

HUMAN INFECTION

Investigations in the past few months have positively disclosed that certain types of encephalitis in man are due to the virus that produces sleeping sickness in horses. The probability of human infection with the equine virus was suggested by Dr. Karl Meyer of California when in 1932 clinical cases of encephalitis in men who had associated with sick animals, was reported. Later, prior to actual demonstration of the virus in man, the presence of substances in the blood of recovered cases of encephalitis which were capable of neutralizing the western type of encephalomyelitis virus, were found by Eklund and Blumstein in Minnesota. Conclusive evidence of the relation between equine encephalomyelitis of the western type and human encephalitis was obtained this year in California by Beatrice Howitt of California.

Drs. Eklund and Blumstein of the Minnesota State Board of Health Laboratory in the *Journal of the American Medical Association* issue of November, 1938, report that in the last week of August and first two weeks of September, 1937, six cases of human encephalitis were reported in a county in northwestern Minnesota. All of these cases were farmers, five of whom had had contact with sick horses, the sixth case had had no contact with sick horses but had run a truck in North Dakota not far from the Minnesota border. All six cases were in men from 22 to 51 years of age; two of them died after an illness of four or five days. In

three cases an acute illness lasted a week. In the sixth case an acute illness lasted three weeks. An autopsy was performed on one of the men who had died. In January 1938 blood was collected from three of the patients who had recovered and the serum forwarded to Dr. Carl Ten Broeck of the Rockefeller Institute for Medical Research. On April 21, 1938, Dr. Ten Broeck reported they had neutralized the western strain of equine encephalomyelitis by the serum of one of the patients. The blood was again collected from this patient in May and neutralization was again demonstrated by Dr. Ten Broeck. They reported that "during the latter part of August and early September, 1938, attacks of what appeared to be a similar disease occurred in Minnesota. Most of these patients had had no contact with horses; the majority lived on farms or in small towns. Blood samples had been collected for identification of the virus."

In the November 11, 1938 issue of *Science*, Beatrice Howitt of the Hooper Foundation of the University of California reports the recovery of the virus of the western strain of equine encephalomyelitis from the brain of a 20 months' old boy who had died in the Fresno County Hospital, Fresno, California. The child contracted the disease on August 25th and died five days later. The virus was transmitted to Swiss mice, from the mice into monkeys, guinea pigs, young rabbits and rats, causing them all to die of the disease. The virus neutralized hyper-immune serum of the western type of equine encephalomyelitis but not those of the eastern type, nor was there any neutralization with the immune serums of the St. Louis type of human encephalitis. She states: "It is interesting that the virus of equine encephalomyelitis should have been found in man almost coincidentally in two widely separated portions of the United States," referring to the Massachusetts outbreak due to the eastern type of virus. She further states "the virus in man due to the western type and the virus in man due to the eastern type are serologically and immunologically distinct from each other."

In the September 30, 1938, issue of *Science* Drs. Webster and Wright of the Rockefeller Institute for Medical Research reported the recovery of equine encephalomyelitis virus from the brain tissue of human cases of encephalitis in Massachusetts. Later in August and early in September 1938 an outbreak of eastern equine encephalomyelitis which was unprecedented, appeared in southeastern Massachusetts. This was accompanied by fatal cases in children nearby. Fothergill, Dingle, Farber and Connerly report the isolation of the eastern encephalomyelitis virus from one of these fatal human cases and the authors confirmed the results obtained by these men and described positive findings in four additional cases. Brain tissues from seven cases were sent to them for study by Drs. Pape and Feemster of the Massachusetts State Department of Health, and of these seven, five yielded the eastern encephalomyelitis virus. Specific neutralization tests were conducted on the four strains of virus with hyper-immune encephalomyelitis rabbit serum. The immune serum showed a protective effect, thus completing the identification of the known

virus strains as the eastern equine encephalomyelitis. Western equine encephalomyelitis immune serum did not immunize the virus. They further state: "This is the first instance in which the horse virus has been definitely implicated as a cause of encephalitis in man."

In the October 1938 issue of *Science* there is an article by Drs. Schoening, Giltner, and Shahan, Pathological Division, Bureau of Animal Industry, entitled "Equine Encephalomyelitis Produced by Inoculation of Human Encephalitis Virus." They used the virus obtained from children who had died of encephalitis in Massachusetts and that Dr. Fothergill had sent to Col. Kelsner of the United States Army. Three horses were inoculated, one of them a normal animal, one the eastern type immune and the other the western type immune animal. They were inoculated intracerebrally. On the day following the inoculation the control horse had a temperature and on the day following developed typical symptoms of encephalomyelitis and died. The horse that was immune to the western type developed the disease and died. The eastern immune animal remained normal. They made the following conclusion: "The addition of man to the list of species susceptible to equine encephalomyelitis virus again brings to the fore the problems of epizootiology in connection with the equine disease and justifies further investigation and study of the role which the many other known susceptible species might have in the spread of the disease amongst horses, as well as to or from the human family."

In the November 5th issue of the *Journal of the American Medical Association* Drs. Wesselhoeft, Smith and Branch of the Haynes Memorial Hospital, Boston, report eight fatal cases of encephalitis in an area where the eastern strain of equine encephalomyelitis in Massachusetts involved more than 200 horses during the same period and where mosquitoes were unusually prevalent. In four of the human cases the virus of the eastern strain was recovered from the brain. They state that "the high mortality rate among the horses has been parallel in these human cases. Furthermore, it is of epidemiological interest that the peak of the human cases of encephalitis in this area appears to have coincided with the peak of the epidemic in the horses. None of our patients came in contact with a horse, but all had been living within the area where the horses had been stricken."

Dr. Riordan, state veterinarian of Massachusetts, at the meeting of the United States Live Stock Sanitary Association in Chicago on December 2nd, stated that the outbreak of encephalomyelitis this summer in the southeastern section of Massachusetts was reported in two counties with a horse population of 4,000 of which 164 died. There were 103 more cases of encephalomyelitis reported in other districts of the state, making a total of 267 cases reported throughout the state this summer. He further stated there were probably a total of 400 cases in the state and that 98 per cent died.

PREVENTIVE VACCINATION

Definite advances have been made as a result of the laboratory studies in the establishment of immunity in

horses by vaccine. A new type of vaccine known as the "chick embryo" vaccine which was made from the chick embryo and developed by Beard, Finkelstein, Sealey and Wyckoff. Higbie and Howitt were the first to infect chick embryos in the laboratory with equine encephalomyelitis virus. In June 1938, this vaccine was licensed by the Federal Bureau of Animal Industry and was placed on the market by licensed commercial laboratories and sold to veterinarians. It has been extensively used in the field throughout the country since that time. The chick vaccine is prepared from 9- to 12-day chick embryos that are inoculated with the virus of encephalomyelitis present in the brains of horses that die from the disease. The virus is filtered thus ridding it of all bacteria. In its pure form it is inoculated through the egg shell. By cracking the egg with a hypodermic needle the virus is deposited on the membranes surrounding the chick embryo. The virus multiplies very rapidly in this embryo and destroys it in from 18 to 24 hours. The laboratory workers report that a very large amount of virus is found in the embryo, many more times than is found in the brains of animals artificially inoculated. The chick embryos are taken out of the shell under laboratory conditions, subjected to a 0.4 per cent solution of formalin which destroys the virus thus producing a vaccine in which no active virus is present.

Doctors Shahan, Giltner and Schoening state that prior to the treatment with formalin there is a tremendous amount of virus in the embryo and it has been estimated in some cases there are ten million times more virus in the chick embryo than in the horse's brain. These men report that in their laboratory at the pathological division of the Bureau of Animal Industry they have spent a number of months studying and working with this chick embryo vaccine contemporarily with other laboratories. They state that while there are certain unsolved technicalities to be considered, there is indication as to the potency of a properly prepared chick vaccine. "Horses as well as guinea pigs develop an immunity of a high degree through the use of this vaccine, even horses resisting a most severe exposure, that of direct intra-cerebral inoculation." Dr. Schoening, in his address in December to the Horse and Mule Association of America, stated that the immunity produced by the chick vaccine both in laboratory animals and horses has been outstanding; "animals treated with the chick vaccine can withstand very severe doses of experimental massive injection. A recent test conducted by the Bureau of Animal Industry on horses indicated a high degree of immunity in the animals six months after vaccination with the chick vaccine. The test has just recently been completed. Six months ago we immunized three horses—this was a commercial vaccine, by the way, a commercial chick vaccine—two injections seven days apart were administered. Two weeks ago these animals were exposed to the virus of the disease by direct inoculation into the brain, which is the most severe method of exposure possible. At the same time three normal horses which had not been vaccinated were inoculated with the same material into the brain. The result of this experiment was that the three normal horses promptly showed

a rise of temperature, developed all of the symptoms of encephalomyelitis within four days, became prostrated and died, whereas the vaccinated horses showed no rise in temperature and remained perfectly normal."

Dr. Schoening further stated that this experiment has a considerable practical application and "it indicates that an animal, as a result of vaccination, may remain resistant for at least six months time. This is a considerable increase over the old brain tissue vaccine. That was one of the disadvantages of that product. It would produce some immunity, but the immunity was not as long lived as it was thought desirable." He stated that their laboratory now have animals on test which they will expose "perhaps three months later, which will be nine months after they have been vaccinated or possibly a year, and we may get further information to indicate that protection may be afforded beyond the six months period. But a six months period would be ample from a practical standpoint to protect animals during the time of the season when the insects would be prevalent." Shahan, Giltner and Schoening report as a result of some months work in the Bureau Laboratory that "immunization against eastern type infection appears more difficult of accomplishment than that against western type. While one dose of as small an amount of vaccine as 0.5 cc. frequently if not generally induces immunity against intra-cerebral exposure of guinea pigs with western virus, two doses at intervals of some days is usually required to effect immunization against eastern virus." Dr. Schoening states that "a large number of horses were subjected to vaccination procedures, both before and during this year's epizootic. Data now available indicates that about 2,000 horses vaccinated with the original formolized brain tissue vaccine two weeks before the outbreak, less than 1 per cent developed the disease. Of about the same number of horses vaccinated at the same time with the new formolized chick embryo tissue vaccine, only about 0.1 per cent contracted sleeping sickness. Again, of about 6,000 horses vaccinated with the brain tissue vaccine during the epizootic, about 1.5 per cent developed the disease; while of over 30,000 horses vaccinated at the same time with the new chick vaccine, less than 0.5 per cent developed the disease. These figures correctly indicate the value of vaccination, both before and during an outbreak, and the superiority of the new chick vaccine over the old brain tissue vaccine. However, best results from vaccination can be expected when animals are vaccinated several weeks in advance of the time when the disease might be expected to appear." He further states: "We have found that the new vaccine commercially prepared gave adequate protection in laboratory animals against all strains of virus recovered from this year's outbreak. These strains included both eastern and western type from Florida, North Carolina, Massachusetts, Illinois, Minnesota, and Kansas.

Chick embryo vaccine made from western strain of virus immunizes only for the western type of disease. Eastern chick embryo vaccines immunize only against eastern type of disease. To date no chick embryo vaccine has been made that will protect against both eastern and western type of disease. Dr. Schoening states

that vaccination can be performed in a horse, however, with both the eastern and western strain vaccines at the same time. The laboratory workers of the Bureau of Animal Industry report that as a result of their work during the past summer with the chick embryo vaccine they find "exposure of the vaccine to high temperatures such as prevail during the summer months lessens the antigenicity of the vaccine. Light may also be deleterious. Even exposure to warm temperatures of 75° to 80° Fahrenheit in the dark results in a gradual lessening of potency." For these reasons it is very necessary that the chick vaccine should be stored under refrigeration until actually used.

PREVENTION

The history of outbreaks of sleeping sickness, particularly that of the western virus, when it appears in a territory is that it reappears in the same territory the following season, and extends to new territory and the number of cases increase until the outbreak reaches a peak, and the number of cases decrease in the area the following season. Investigators to date have not determined how or where or in what animals or fowls the infection or the virus is harbored from one season to the next. The disease in Minnesota apparently reached its peak in the summer of 1937. The number of cases materially decreased in the outbreak in 1938, particularly in the sections of the state where it was so general in the season of 1937. As a result of the knowledge we now have of the method of spread of the disease and the immunity that can be obtained with the new chick embryo tissue vaccine, we are better prepared than ever to prevent the spread of the disease when it appears in a territory and to materially reduce losses in the horses.

It is very necessary that horse owners in this state where we know the virus is located, take all precautions to protect the animals against insects for a period of six months beginning the middle of May or the first of June. This is very important as a method of protecting the animals against the virus. Horses and mules should be kept in screened stables at night until after the appearance of the first heavy frost. While working they should be covered with muslin flynets and the exposed parts should be sprayed two or three times a day with a good fly repellent spray. The Bureau of Animal Industry formula for a home-made spray is effective. Illinois Experimental Station reports good results in the use of a preparation developed by them to protect pastured animals from mosquitoes and flies. It should be applied lightly with a brush all over the body, brushing with the hair and not against it. The application of this material once a week is sufficient as a rule unless the mosquitoes are very numerous, when it should be applied twice a week. It should never be used on work horses as it may produce irritation of the skin. The formula for this preparation is "fish oil (cold pressed fish oil best) 100 parts, oil of tar (from pine trees) 50 parts, crude carbolic acid 1 part."

With our knowledge of the new chick embryo tissue vaccine although it is not one hundred per cent effective we have an effective preventive treatment that will pro-

tect a horse or mule for a period of six months, if the vaccine is maintained under refrigeration until used and is properly administered. In Minnesota we are not justified in recommending that all horses in the state, or in any particular territory in the state, be vaccinated as a preventive this coming season. It is an economic problem and each horse owner should consult his local veterinarian, taking into consideration his location in the state, and then decide for himself. A number of the veterinarians state they think they have had results when the disease appears in a territory, after they have given only one dose of the chick embryo vaccine. No doubt some immunity is conferred with the one dose but such immunity is not acquired until four or five days after the administration of the one dose and the second dose should be administered in order to produce effective immunity. The best results can be obtained by administering the two doses of the vaccine prior to the appearance of the disease in a neighborhood.

The first symptoms of the disease in a horse are not as a rule recognized. When it appears in a territory all horse owners should examine their horses carefully two or three times a day and when the first symptoms appear they should immediately call their veterinarian and follow out his instructions; with proper treatment, good nursing and care the mortality may be reduced to a minimum.

OUTBREAKS OF THE DISEASE IN MINNESOTA AND SURROUNDING STATES

In the summer of 1938 the number of cases and the losses have been very much less in the states of North and South Dakota and Minnesota. In Iowa, however, there were more cases than in any prior year but the percentage of deaths was relatively reduced. In Wisconsin the disease was more general and extended eastwardly. We received a report from the livestock sanitary authority of Wisconsin, dated January 5, 1939, that reports of 205 practicing veterinarians disclose there were 7,289 cases and 1,538 or 21.1 per cent deaths. They advise 10 per cent should be added to these figures to account for unreported cases. A report from the state of Iowa, dated January 6, 1939, discloses that they have reports from 495 practicing veterinarians of 57,710 cases of which 10,301 or 17.84 per cent died. They state that they expect to receive reports from 115 more veterinarians and these reports will add materially to their cases. On January 5, 1939, the state of North Dakota reported that they do not have the number of cases but that reports from all the counties in the state with the exception of five disclose 2,209 horses died of the disease.

The disease was first reported in Minnesota in 1933. There were a few cases reported in the southwestern part of the state that were clinically diagnosed but the diagnosis was not confirmed by laboratory findings. In 1934 there were 330 cases reported of which 110 or 33½ per cent died. In 1935 there were 3,337 cases reported of which 1,244 or 37.2 per cent died. In 1936 there were 112 cases of which 31 or 27.6 per cent died. In 1937 there were 45,275 cases of which 10,120 or 22.35 per cent died. To date we have reports from 257 practicing

veterinarians who experienced the disease in their practices in Minnesota during the past summer. We are satisfied that these reports represent all of the veterinarians who experienced the disease within the state with the exception of five. In the territory in which these five are located, judging from the reports of other veterinarians in the same territory, they experienced very few cases.

In preparing the compilation of the incidence of the disease during the past summer we have included the reports of the 257 veterinarians and the reports received from a few county agents in counties where there are no practicing veterinarians, and also cases to which veterinarians were not called. The compilation discloses that during the outbreak there were a total of 23,686 cases of which 4,979 or 21.02 per cent died. We sent questionnaires to the practicing veterinarians of the state on which to furnish their reports relative to the outbreaks and the results of their experience with the different vaccines that were used within the state prior to and during the outbreak. The compilation of these reports discloses that throughout the state the average number of horses that contracted the disease on each farm where it appeared was one plus. The anti-encephalomyelitis serum was reported used therapeutically on 8,602 horses, the majority of the veterinarians stating that in their experience the serum is of therapeutic value if administered on the first or second day after the first symptoms appear. The formolized brain tissue (2 doses) was administered to 11,498 animals, of which 294 or 2.55 per cent developed encephalomyelitis. 41,596 animals were vaccinated with two doses of the chick embryo tissue vaccine, of which 189 or 0.45 per cent developed

the disease. 7,932 animals were vaccinated with the Rosenow sero-vaccine, of which 274 contracted the disease or 3.45 per cent. The number of animals in these areas that were vaccinated with the formolized brain tissue vaccine during the epidemic was 6,882, of which 112 contracted the disease or 1.6 per cent; 31,622 horses in these areas were vaccinated with the chick embryo tissue vaccine (2 doses), of which 104 or 0.32 per cent contracted the disease; and 6,518 horses in these areas were vaccinated with the Rosenow product, of which 100 contracted the disease or 1.5 per cent.

The reports disclose that 57 veterinarians experienced a secondary outbreak of the so-called "X" disease. They reported 173 animals affected, of which 110 or 63.5 per cent died. Of these 173 animals 14 had received the formolized brain tissue vaccine and 61 had received the chick embryo tissue vaccine. The last case reported was on December 11, 1938, but the majority of the cases appeared during the middle or latter part of October.

In our compilation of the outbreak of 1937, for the reason that many of the veterinarians' practices included territory in more than one county and for the further reason that during the outbreak they were so intensively busy, we did not request them to furnish reports of the cases in individual counties and the compilation of the incidence of the disease was compiled in nine districts of the state. In our compilation of the outbreak in 1938 we succeeded in receiving reports of the cases by counties. The incidence of the disease in 1938 was materially less in the territories where it was generally prevalent in 1937, and the majority of the cases during the 1938 outbreak appeared in the districts where it was not generally prevalent in the 1937 outbreak.

Comparative Energy Expenditures and Time Required for Digestion of Homogenized or Pureed Vegetables in the Human Stomach

John A. Killian, Ph.D.

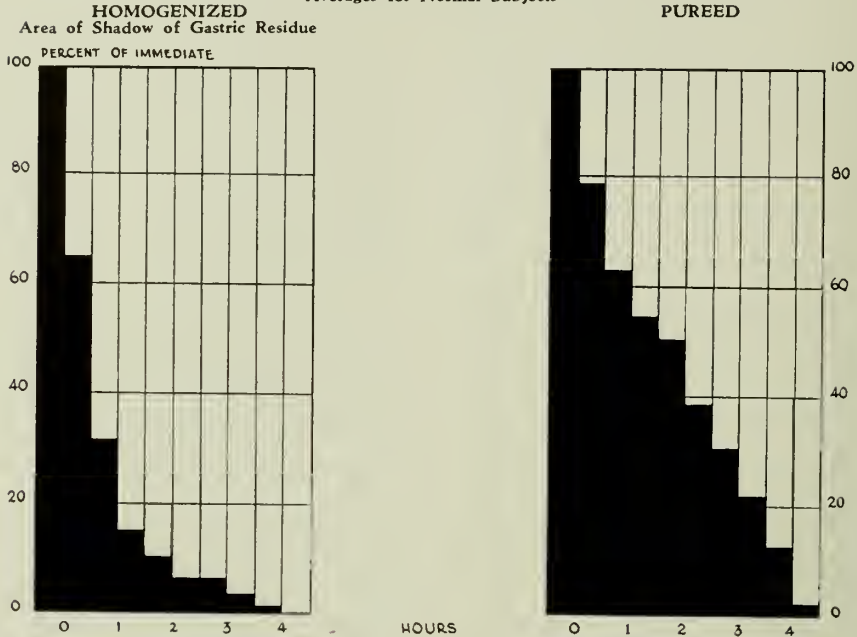
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CALDWELL¹ recently reported a combined laboratory and clinical study of the value of homogenized foods as supplements to the milk diet of infants as early as three months. The author observed that in in-vitro digestion tests, starch was digested at a more rapid rate than either that in commercially strained or home strained vegetables. This report suggested the advisability of investigating the advantages and limitations of the use of fruits and vegetables in homogenized form as supplements to the smooth or

bland diet for the treatment of patients with functional disturbances of the gastrointestinal tract. The initial step in this investigation was the determination of both the comparative energy expenses and the comparative times required for digestion of homogenized and of pureed vegetables in the stomachs of average normal adults and of ambulatory patients with chronic peptic ulcers, who, according to McLester,² require adequate nutrition but at the same time rest, both motor and secretory, for the stomach.

CHART I
Comparative Rates of Digestion in the Stomach of Homogenized and of Pureed Vegetables
Averages for Normal Subjects



EXPERIMENTAL METHOD

In their monograph "Food Ingestion and Energy Transformations," Benedict and Carpenter³ have presented suggestions concerning methods for studying effects upon basal metabolism (more accurately called "fasting metabolism") of the ingestion of food or drugs. As indices of the energy expenditures for digestion of foods, these authors have determined the total increments in heat production chargeable to the ingestion of the food and have calculated this increment as a percentage fraction of the total fuel value of the food.

The plan of the experiments adopted incorporated all of the suggestions offered by Benedict and Carpenter and in addition, included determinations of the emptying times of the stomach by fluoroscopy and roentgenograms. The subjects reported at the laboratory at 9 a. m., after a fast from all food for 15 hours and tested for two hours before consuming the foods under test. At the beginning of the second hour of this rest period, the subjects emptied their bladders completely by voluntary voiding and drank 300 cc. of tap water. During the last ten minutes of the second hour of the test period, their basal metabolic rates were determined by the open circuit method, using the apparatus described by Bailey.⁴ The foods under test were fed to the experimental subjects at approximately body temperature.

The procedure utilized in determinations of gastric evacuation times was identical with that adopted by Van Liere and Sleeth,⁵ except for the fact that roentgenograms were made at intervals after ingestion of the foods in addition to fluoroscopic examinations. One ounce of BaSO₄ was added to each experimental meal before consumption of the meal. Roentgenograms were made

TABLE I
Comparative Times and Energy Expenses for Digestion in the Stomach of Either Homogenized or Pureed Vegetables.

Subject	Gastric Evacuation Time (Hours)		Total Increment in Calories Produced During Period of Gastric Digestion	
	Homogenized Vegetables	Vegetables	Homogenized Vegetables	Pureed Vegetables
T. C.	2.2 2.5	4.6 4.0	10.0 9.2	21.1 29.5
C. O.	1.5	3.5	9.4	20.1
L. G.	3.5	4.9	7.3	29.8
Average	2.4	4.2	8.9	25.1

(with the film at a distance of approximately 75 cm. from the source of the X-rays), immediately after consumption of the meals and then at intervals of approximately thirty minutes during the course of gastric digestion of the meals. Fluoroscopic examinations were made at the beginning of the second hour after consumption of the meal and were continued at intervals as long as the gastric contents could be seen with the fluoroscope. The intervals of time after consumption of the meals until all demonstrable remnants of the meal had left the stomach, were taken as the gastric evacuation times.

Throughout the experimental periods, all subjects rested in an invalid's wheel chair, which was placed between the gasometer on one side and the fluoroscope on the other side. The subjects moved from the wheel chairs only to stand erect for the voiding of urine at the end of each hour and for their fluoroscopic examinations or roentgenograms. Determinations of total heat pro-

duction were made during the interval of ten minutes immediately preceding the radiographic examinations. Throughout the experimental periods, the subjects remained awake and in complete muscular repose.

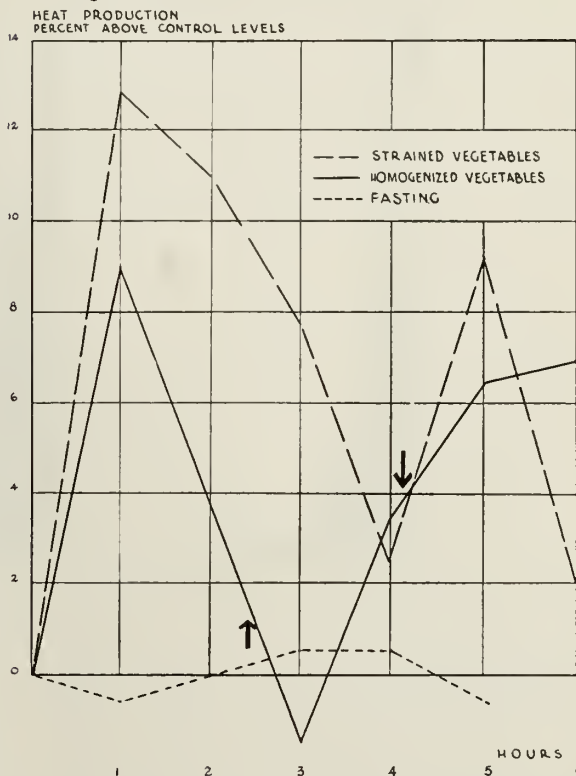
The subjects utilized in these experiments were apparently normal, healthy adults who, in fractional gastric analyses and radiographic studies of gastrointestinal function, showed neither organic nor functional abnormalities in their gastrointestinal tracts. Both T. C. and C. O. have stomachs of average normal motility; L. G. has a "slow stomach." Chemical analyses of blood and urine and repeated determinations of basal metabolic rates indicated no demonstrable disturbances of metabolism in these subjects. The samples of homogenized vegetables utilized in these experiments were taken from a canned mixture of equal parts of carrots, spinach and peas which contained 9.3 per cent of total solids, 2.0 per cent of protein and 5.2 per cent of total carbohydrates (by difference). The strained vegetables were prepared by combining in equal portions by weight, the contents of canned spinach, canned peas and canned diced carrots. This mixture was heated to approximately 60 C. and passed through a "Standard Babies' Siv." Samples of the strained vegetables utilized in these experiments were analysed and the average total solids was 10.9 per cent; average protein content was 2.17 per cent and the average amount of total carbohydrate was 4.63 per cent (by difference).

In calculating the total fuel values of the meals, the factor 4.1 was used to determine the caloric value of both protein and carbohydrate. The sum of the calories which could be derived from these two constituents of the vegetables represents the total estimated fuel value of the vegetables. Since the amount of fat in the vegetables (total ether extract) was only 0.2 per cent, fat calories were not included in estimates of the total fuel values of the meals. In all experiments, 300 grams of either homogenized vegetables or strained vegetables were consumed by each of the subjects. The comparative experiments carried out on each subject were made before and after intervals of 48 hours. At the end of the period of the first experiment, the subject received a dose of castor oil to eliminate from the intestinal tract all residua of the barium administered. The second experiment was made on the third day following the first experiment. Before beginning the second experiment, a roentgenogram of the gastrointestinal tract was made to exclude the possibility of barium having been retained from the previous experiment.

EXPERIMENTAL RESULTS

Comparative gastric evacuation times after the meals are reported in table 1. Two series of tests were made on T. C.; in the first series, the emptying time of the stomach was 2.2 hours after the meal of homogenized vegetables and 4.6 hours after the meal of strained vegetables and in the second series, after the meal of homogenized vegetables, the gastric emptying time was between 2 and 2.5 hours, but after the meal of strained vegetables, it was 4 hours.

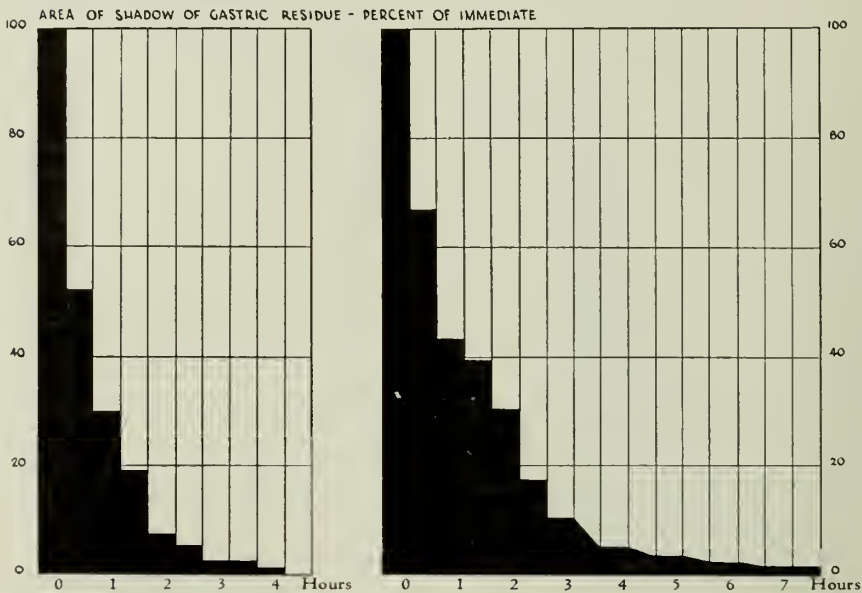
CHART II
Comparative Rates of Increase in Heat Production and Emptying Times of Stomach After Either Homogenized or Pureed Vegetables. Averages for Three Normal Subjects. Indicates Evacuation Time of Stomach.



The emptying times of the stomach after the meals of strained vegetables varied from 140 to 233 per cent of the emptying times for the homogenized vegetables. In the four experiments made on three subjects, the average increase in emptying time of the stomach after the strained vegetables, over the time required for gastric digestion of the homogenized vegetables was 86 per cent of the time required for the homogenized vegetables.

As indices of the relative rates of progress of the vegetables through the stomachs of the subjects, the areas of the shadows of the residues of the meals in the stomach were determined with the use of a planimeter and calculated as percentages of the shadows in the roentgenograms made immediately after ingestion of the vegetables. The columns of chart I represent the average rates of emptying of the stomach after meals of homogenized or strained vegetables for four experiments on three normal subjects in terms of the percentage decreases in the areas of the shadows. Obviously, this method of interpretation of the radiographic findings introduces an error in the fact that the anteroposterior depth of the gastric residue is not considered. However, it does conform to the radiologist's estimate of the volume of gastric contents and along with data for the emptying time of the stomach, presents a graphic representation of the progress of the meal through the stomach. At the end of two hours, the area of the shadow of the residue of homogenized vegetables had

CHART III
Comparative Rates of Digestion in the Stomach of Homogenized and of Pureed Vegetables.
Averages for All Subjects With Peptic Ulcers.



fallen to less than 10 per cent of the immediate but during this period, the area of the residue of strained vegetables had reached only 48 per cent of the shadow of the meal immediately after consumption. In fact, the average area of the residue of the strained vegetables after four hours is appreciably greater than the residue of the homogenized vegetables at the end of two hours of digestion in the stomach.

Average variations in total heat production from the level of the control hours, are represented by the curves in chart II. In the control experiment (on T. C.) total heat productions were determined before and at intervals of one hour for 4 hours after the consumption of 300 cc. of water at body temperature, and these results are represented by the curve marked "fasting" in the chart. The variations in total heat produced per hour during this experiment, were from -0.5 to $+0.4$ per cent of the control level. After ingestion of either homogenized or strained vegetables, prompt increases in total heat production were noted, reaching their peaks during the first hour after ingestion of the vegetables and then decline during the subsequent hours.

The positions of the arrows on the curves indicate the average times at which the meals have left the stomach. It is significant to note that the peaks in the curves for increases in total heat production and the major part of the total increase in heat produced above the control levels, were observed during the period intervening between consumption of the vegetables and the time of complete emptying of the stomach.

In the calculation of the energy expense for digestion of the meals, total increments in heat produced above the control levels have been calculated for the intervals required for gastric digestion of the meals, as determined

by fluoroscopy and roentgenograms. Data for total increments in heat produced during periods required for gastric digestion of the vegetables are given in table 1. In all experiments, the total increases in heat produced during gastric digestion of the pureed vegetables were greater than those found after the homogenized vegetables. From the curves of chart II, it will be seen that these differences are not due to variations in the maximum heights of the curves but rather to relative lengths of the periods during which the curves are sustained above the control levels. For each of the two forms of vegetables, there is evident some relationship between the duration of extra heat production indicated by chart II and the rate of decline in the size of the residue of the meal in chart I which suggested a dependence of the extra heat produced upon the work being done by the stomach to digest and to evacuate the meal.

During the period in which residues of the strained vegetables could be demonstrated in the stomach, the average total increment in heat was 25.1 calories, that is, 30.2 per cent of the estimated fuel value of the meal. For the homogenized vegetables, the average total increment in heat production was 8.9 calories or 10.1 per cent of their estimated fuel value. These ratios, interpreted according to Benedict and Carpenter, indicate that the energy expenditure for digestion of homogenized vegetables in the stomach of the normal subject is approximately one-third of that required for the strained vegetables.

These studies of the comparative gastric evacuation times for meals of homogenized and strained vegetables were extended to include a group of ambulatory patients who gave histories of chronic peptic ulcers. A group of eight patients, seven men and one woman, were selected

representing one case of gastric ulcer and seven cases of duodenal ulcer. Brief abstracts of their histories are given. Clinic or previous roentgen diagnoses were confirmed by roentgenograms and fluoroscopy and these findings are described briefly in table 2.

Samples of the canned combination of homogenized vegetables were fed as described above for the normal subjects. Pureed vegetables were prepared according to the same procedure as that used for the strained vegetables for the experiments on the normal subjects except in one case, M. G., in which the mixture of the three canned vegetables was pureed by macerating with a fork. This sample was not strained and no fiber was discarded. Determinations of the comparative gastric evacuation times were made as described above in the experiments on the normal subjects. Results of the two series of radiographic studies of each subject are summarized in table 2 and chart III.

TABLE 2
Comparative Gastric Evacuation Times Shown by Cases of Peptic Ulcer for Either Homogenized or Pureed Vegetables.

Subject	Gastric Evacuation Times (Hours)		Analyses of Pureed Vegetables	
	Homogenized Vegetables	Pureed Vegetables	Total Solids (Perc.)	Crude Fiber (Perc.)
L. S.	4.5	9.0+	11.9	0.69
F. R.	2.5	4.5	12.7	1.41
M. G.	3.0	4.0	12.9	1.39
A. S.	3.0	3.0	11.9	0.79
M. M.	3.0	3.0	12.8	1.40
R. H.	5.5	8.0+	12.5	1.41
A. B.	3.5	4.5	12.0	1.39
G. G.	3.0	4.0	12.0	1.39
Average	3.5±0.7	5.0±1.7		

The homogenized vegetables had a fiber content of 0.60 per cent but the amounts of fiber in the strained vegetables varied from 0.69 to 1.41 per cent. Apparently straining the vegetables had a variable effect upon the fiber content of the samples; five had fiber contents equivalent to that of the unstrained sample.

One patient, L. S., had a pyloric stenosis; his gastric evacuation time for the homogenized vegetables was 4.5 hours but even after 9.0 hours a residue of the strained vegetables was demonstrable in his stomach, although the fiber content of the strained vegetables was only 15 per cent higher than that of the homogenized vegetables. R. H. showed an atomy and dilatation of his stomach; his gastric emptying time for the homogenized vegetables although unusually long, i. e., 5.5 hours, was 68 per cent of that for the strained vegetables. A retarded gastric motility was found in F. R.; his gastric evacuation time for the homogenized vegetables was 2.5 hours and for the strained vegetables 4.5 hours. A. S. and M. M., exhibited no difference between the emptying times of the stomach after meals of either homogenized or strained vegetables.

The comparative rates of digestion of homogenized and of strained vegetables in the stomachs of these cases with histories of peptic ulcers have been summarized in chart III. Only traces of residues of the meals of homogenized vegetables, i. e., 2 per cent of the area of the shadow immediately after their consumption were visible at the end of 3 hours. However, after the strained or pureed vegetables, the average length of time during which remnants of the meals were demonstrable in the stomach was 6 hours. The average gastric evacuation time for the homogenized vegetables was 3.5 hours and for the strained and pureed vegetables more than 5.0 hours.

ABSTRACTS OF CLINICAL HISTORIES OF PATIENTS WITH PEPTIC ULCERS

L. S. — M., Age 50 — Has complained of abdominal pain two to three hours after meals, relieved by food and alkalis, duration about two years; has lost 20 pounds since onset of symptoms; roentgen diagnosis: chronic duodenal ulcer with pyloric stenosis.

F. R. — M., Age 37 — Has complained of stomach trouble for fifteen years, severe pain after meals, vomiting and hematemesis; gastroenterostomy was performed thirteen months previously; roentgen diagnosis: chronic duodenal ulcer, gastrojejunostomy and retarded gastric motility.

M. G. — M., Age 27 — Has complained of stomach trouble for two years, epigastric pain about one hour after meals, relieved by food and alkalis; roentgen diagnosis: simple duodenal ulcer, no evidence of pyloric stenosis.

A. S. — F., Age 42 — Has complained of stomach trouble for three years, epigastric pain about two hours after meals, relieved by food and alkalis; roentgen diagnosis: simple duodenal ulcer, no evidence of pyloric stenosis.

M. M. — M., Age 37 — Has complained of stomach trouble for two years with seasonal exacerbations, pain localized midway between umbilicus and xyphoid process about one hour after meals, relieved by alkalis; roentgen diagnosis: simple duodenal ulcer, no evidence of pyloric stenosis.

R. H. — M., Age 50 — Has complained of stomach trouble for many years, with an acute exacerbation within past several months, pain in left hypochondrium localized just at the costal margin, vomiting, poor appetite and loss in weight; roentgen diagnosis: chronic gastric ulcer, callous and penetrating in type with a possibility of a secondary malignant change, an atonic stomach with moderate gastrectasia.

A. B. — M., Age 49 — Has complained of stomach trouble for five years, epigastric pain two to three hours after meals, relieved by food; has been on an ulcer diet for several months; roentgen diagnosis: chronic duodenal ulcer, no evidence of pyloric stenosis.

G. G. — M., Age 34 — Operated nine years previously for perforated peptic ulcer; at present has mild gastric symptoms, pain two to three hours after meals, relieved by food; roentgen diagnosis: chronic duodenal ulcer, no evidence of pyloric stenosis.

SUMMARY

The objectives in the experiments described in this report were (a) to determine the comparative gastric evacuation times after meals of either homogenized or strained vegetables and (b) to estimate the comparative energy expenses for their digestion. Observations are reported on three average normal adults and eight adults with histories of chronic peptic ulcers, confirmed by radiographic examinations before determinations of rates of digestion of vegetables were made.

In four comparative tests made on three normal subjects, the average emptying time of the stomach after

meals of homogenized vegetables was 43 per cent less than the average emptying time of the stomach after meals of strained vegetables.

As indices of the energy expenses for digestion of the meals in the stomach, the total increments in heat production, for the periods of gastric digestion, chargeable to ingestion of the vegetables, were calculated as percentage fractions of the estimated total fuel values of the meals. The average energy expense for gastric digestion of the homogenized vegetables, determined in four experiments, was 10 per cent of the fuel value of the vegetables and for digestion of the strained vegetables, determined in four experiments, it was 30 per cent of their fuel values.

Gastric evacuation times for homogenized vegetables were less than those for strained or pureed vegetables in six of the eight cases of chronic peptic ulcer. The greatest differences in gastric emptying times for the two

forms of vegetables were observed in cases showing pyloric stenosis or retarded gastric motility. The average gastric evacuation time for 300 gm. of homogenized vegetables was 3.5 hours and for 300 gm. of pureed vegetables more than 5.0 hours.

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The homogenized foods referred to were furnished by Libby, McNeill and Libby, Chicago, Illinois.

The Adsorptive Power of Animal Charcoal for the Toxic Principle of Tuberculin*

Preliminary Report

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Baltimore, Maryland

TAKING into consideration the recent work showing the ability of finely divided carbon to apparently neutralize the toxic properties of the gonococcus in either a systemic or a localized infection as shown following its intravenous injection, it was suggested that we attempt to apply this physical property of carbon to either the tubercle bacillus or to its toxin. To apply this to the human strain of the organism, we have begun by attempting to detoxify or to adsorb the toxic molecules of the standard preparation of Old Tuberculin.

Our first preparation was made by adding one gram of finely divided and activated (wood) charcoal to five cubic centimeters of O. T. in the dilution of one to a thousand. The solution was shaken for ten minutes and then filtered. The first filtrate contained too much carbon to be used in the Mantoux test for fear of permanent discoloration of the skin. The suspension was therefore centrifuged for two hours and then filtered twice through No. 2 Whatman filter paper. The remaining filtrate was practically colorless although the volume was reduced to three-tenths of a cubic centimeter. This preparation was autoclaved along with two cubic centimeters of standard one to a thousand O. T. Two patients who had previously reacted strongly to the Mantoux test but who had no active childhood or adult type

of lesion were chosen as subjects. In each of their right arms one-tenth of a cubic centimeter of the preparation was injected intradermally, the left arms receiving the standard Mantoux injection (the one to one thousand O. T. which had been autoclaved as a control). The results were read in forty-eight hours and all four arms gave responses varying from three plus to four plus. The results of the first experiment were, therefore, discouraging.

A second preparation was then made by adding one gram of wood charcoal and one gram of animal (bone) charcoal to five cubic centimeters of one to a thousand O. T. This solution was shaken for ten minutes and then filtered through No. 2 Whatman filter paper. The filtrate this time was colorless and was sterilized as before with a control. One-tenth of a cubic centimeter of this preparation was injected into the flexor surfaces of the right arms of two more of the same type of patients, the left arms again serving as the controls. In forty-eight hours the results were read and in both cases the right arms showed no response to the preparation while the left arms gave a plus three and a plus four response, respectively.

A third preparation was made by adding one gram of the animal charcoal alone to seven cubic centimeters of the standard one to a thousand O. T. This suspension was shaken for two minutes and then filtered

*Original article submitted July 15, 1938.

through a plain untreated filterpaper to rule out the possibility of any reaction of the chemically treated Whatman No. 2 paper. The first filtrate was absolutely colorless and measured approximately four cubic centimeters due to loss by absorption. This was sterilized as before with a control and injections made into the right arms of ten patients, the left arms again serving as controls. With one possible exception all of the right arms gave negative results after forty-eight hours while the controls gave responses varying from three plus to four plus. The one exception gave a very small discolored area (approximately one centimeter) without edema which may have been due to capillary trauma. All patients were examined twenty-four hours later for delayed responses and found to be negative (right forearms).

The results of this series of cases demonstrated conclusively to our minds that animal charcoal adsorbs the toxic principle of tuberculin. We have, therefore, decided to continue this line of work by attempting to

introduce a carbon suspension into a series of animals. First we shall determine how we can place it in the mediastinal lymph glands and then, by infecting another group of animals with tuberculosis, we shall attempt to adsorb the toxin released from the parenchymatous lesion by the introduction of charcoal into the regional glands. If this is successful, another form of rest therapy may be made available to release the body as a whole from the continued toxic effects of the tuberculosis toxin.

We wish to express our gratitude to the following for their efforts in advisory and in practical capacities: Samuel B. English, M.D., Superintendent of the New Jersey State Sanatorium for Tuberculous Diseases at Glen Gardner; Homer P. Arena, D.P.; and Howard Cline, laboratory technician.

REFERENCE

E. Saint Jacques: *Union Med. do. Canada* 66:1150-1152, Nov. '37.

The Influence of Prolonged Administration of High Dosages of Vitamin D Upon the Serum Calcium of Adults*

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FROM time to time, there have appeared in the literature discussions on the alleged toxic influence of large doses of vitamin D in adults. In support of this contention, most authors regard an increase in serum calcium as the basis for potential harm to the organism, and use the degree of serum calcium elevation as an index of toxicity. Following the publication of Dreyer and Reed,¹ the author treated several hundred arthritic patients with high dosages of a special vitamin D.* Uniformly good results were obtained; in many cases, patients were restored to economic usefulness. In fact, few if any patients failed to respond to some degree, a finding concurred in by both Livingston² and Steck.³ Early in this clinical effort,^{4,5} the blood calcium level was determined in all patients prior to and during active therapy. The dosage of vitamin D ranged from 150,000 to 500,000 U. S. P. units daily. We were unable to demonstrate alteration in the serum calcium. In fact, the only evidence of "toxicity" discernible was temporary urinary frequency and nausea which quickly disappeared upon decrease of dosage. It was found, furthermore, that maximum benefit was obtained when the dosage was raised to just below the point where the aforementioned symptoms appeared.

In 1938 Abrams and Bauer⁶ published a report covering their observations on the effect of massive doses of vitamin D on 18 patients with rheumatoid arthritis.

*The vitamin D preparation (Ertron) used in this study was furnished by Nutrition Research Laboratories.

The vitamin preparation used by them was Drisdol in propylene glycol or in sesame oil. In sixteen of the eighteen patients, hypercalcemia developed at some time during the period of vitamin D therapy. In seven cases, fasting serum calcium values varying from 11.2 to 16 mg. per 100 cubic centimeters persisted for weeks after the dosage of vitamin D was reduced or the drug discontinued. These investigators were unable to exceed a dose of 200,000 U. S. P. units daily of the crystalline vitamin D in propylene glycol (administered in milk) without encountering toxic symptoms. Although some patients tolerated larger doses of the crystalline vitamin D in sesame oil, there was not a single instance where a daily dose of 300,000 U. S. P. units could be exceeded without encountering serious toxic symptoms or hypercalcemia. The toxic symptoms consisted of pain, diarrhea, headache, drowsiness, polyuria, polydipsia, and nocturia; they as well as the hypercalcemia in some of the cases persisted for several weeks following discontinuance of the vitamin D therapy.

Among the conclusions drawn by Abrams and Bauer are: "Subjective improvement lasting throughout the period of therapy was observed in eight cases. In only three instances was this accompanied by objective improvement and in only one was it marked. Such improvement was short lived when therapy was discontinued. Our results indicate that the administration of massive doses of vitamin D in rheumatoid arthritis is

TABLE 1

Case No.	Age	Sex	Characterization of Arthritis			Previous Treatment	Vitamin D Therapy		Daily Dose of Vitamin D (U.S.P. Units)	Symptoms of Intolerance	Hypercalcemia	Observed Effects		Weight		End Results and Comments
			Duration	Extent of Involvement	Activity of Disease		Began	Discontinued				Subjective Changes	Objective Changes	Before Taking Vitamin D	In May 1939	
1	71	F	4 years (1933)	Atrophic: left hip; partial osteoporosis of bones	Subacute partial disability	Salicylates, acetylsalicylic acid, intravenous and subcutaneous injections, diathermy, fever therapy	Aug. 1937	Still under treatment	50,000-300,000	Slight nausea, increased micturition at 300,000 units daily	Not present	Less pain	More freedom of motion in affected hip; greater stability of posture	133 lbs.	135 lbs.	Now able to walk, slight limp due to fracture of femoral neck; appetite good; sleeps well; treatment being continued
2	38	M	2 years (1935)	Atrophic: back, ankles, knees and shoulders	Subacute slight disability	Intravenous and subcutaneous injections	Sept. 1937	Still under treatment	50,000-200,000	None	Not present	Disappearance of pain	Complete function of all joints; no swelling	178 lbs.	178 lbs.	Able to work full time; no recurrence of symptoms
3	39	F	7 years (1930)	Atrophic: wrists, elbows, knees, ankles and neck	Acute partial disability	Cod liver oil capsules	Aug. 1937	Aug. 1938	50,000-200,000	Slight increase in micturition at 200,000 units daily	Not present	Disappearance of pain	Complete function of all joints; good posture; no swelling; return to normal contour	100 lbs.	108 lbs.	Able to work full time; good appetite; sleeps well; no recurrence of symptoms
4	44	M	1 year (1935)	Hypertrophic: all joints	Acute marked disability	Cabinet, heat, ultraviolet ray and mineral baths, serum injections	Aug. 1936	Under treatment	50,000-200,000	None	Not present	Disappearance of pain	Complete union of all joints except right thumb; good posture	165 lbs.	169 lbs.	Able to work full time; good appetite; sleeps well; treatment being continued
5	35	F	5 years (1931)	Atrophic: neck, knees, hands and shoulders	Subacute slight disability	Fever therapy, diathermy, salicylates	Feb. 1936	Feb. 1937	50,000-200,000	None	Not present	Disappearance of pain	Complete function of all joints; normal posture	96 lbs.	115 lbs.	Able to work full time; no recurrence of symptoms
6	39	F	1 year (1936)	Hypertrophic: knees, hands, hips, elbows, shoulders and neck	Acute total disability	Diathermy, ultra-red, ultraviolet, salicylates, vaccine combinations, massage, thyroid and pituitary extracts	Oct. 1937	Still under treatment	50,000-800,000	None	Not present	Occasional slight pain	Good posture; good function of all joints	210 lbs.	168 lbs.	Able to work full time; good appetite; sleeps well; treatment being continued
8	54	F	14 years (1922)	Atrophic: sacro-iliac and cervical regions, shoulders, elbows and knees	Chronic acute, total disability	Acetylsalicylic acid, sodium salicylate, special diets	Oct. 1936	May 1937	50,000-800,000	None	Not present	Occasional slight pain	Complete function of all joints; normal posture	105 lbs.	148 lbs.	Able to work full time giving piano lessons; no return of symptoms
9	38	M	1 year (1936)	Hypertrophic: hands, wrists, elbows and knees	Subacute slight disability	Sulphur baths, effervescent medicine	Oct. 1937	Feb. 1938	50,000-300,000	None	Not present	Occasional slight pain	Complete function of all joints; normal posture	201 lbs.	173 lbs.	Able to work full time; no recurrence of symptoms
10	57	F	3 years (1934)	Atrophic: all joints	Acute total disability	Light treatments, massage, salicylates, intravenous and subcutaneous injections (vacutanes and serums)	July 1937	Still under treatment	50,000-200,000	Slight dizziness, nausea, increased micturition at 200,000 units daily	Not present	Moderate occasional pain	Fair posture	95 lbs.	106 lbs.	Able to do some housework; still partially disabled; treatment being continued
11	53	F	13 years (1923)	Atrophic: all joints	Chronic acute, total disability	Teeth extracted, physiotherapy, stretching of arms and legs, intravenous serum, colonic irrigations, diathermy, special diets	June 1936	Still under treatment	50,000-700,000	Increased micturition at 700,000 units daily	Not present	Moderate occasional pain	Fair posture	91 lbs.	115 lbs.	Able to do some housework; all joints have regained function; sleeps well; appetite good; could walk but afraid due to mental attitude; treatment being continued
12	56	F	10 years (1927)	Atrophic: hands, knuckles of fingers, and ankles	Subacute slight disability	Acetylsalicylic acid	Feb. 1937	Aug. 1937	50,000-200,000	None	Not present	Moderate occasional pain	Normal posture; complete function of all joints	114 lbs.	114 lbs.	Able to work full time; in good health
16	43	F	6 years (1931)	Atrophic: hands, wrists, elbows, shoulders, knees, ankles, finger joints ankylosed	Chronic acute, total disability	Colonic irrigations, salicylates, steam baths	June 1937	March 1939	50,000-300,000	Dizziness, slight diarrhea, increased micturition at 300,000 units	Not present	Moderate pain	Partial function of all joints except wrists and knees	128 lbs.	128 lbs.	Decided improvement in function of joints; still unable to walk; good appetite; sleeps well; treatment being continued
17	44	M	4 years (1933)	Atrophic: sacro-iliac joints, left hip, hands and feet	Subacute slight disability	Salicylates	Feb. 1937	Dec. 1937	50,000-200,000	None	Not present	Moderate pain	Complete function of all joints; normal posture	150 lbs.	155 lbs.	Able to work full time; in good health
19	55	F	4 years (1933)	Atrophic: thighs, hips, and sacro-iliac joints	Subacute slight disability	Salicylates, acetylsalicylic acid	May 1937	Jan. 1938	50,000-200,000	None	Not present	Moderate pain	Complete function of all joints; normal posture	152 lbs.	140 lbs.	Able to work full time; in fair health
20	44	F	11 years (1926)	Atrophic: all joints	Acute, partial disability	Zoa light, cabinet baths, typhoid vaccine, salicylates, autogenous culture vaccine, sulphur baths	June 1937	Still under treatment	50,000-200,000	None	Not present	Occasional slight pain	Good function of all joints except left hand and wrist, and right wrist	142 lbs.	157 lbs.	Able to work full time; sleeps well; appetite good; treatment being continued

of little or no value in altering the course of the disease."

The above results and conclusions are distinctly at variance with the findings of other observers in this field, and especially with my own clinical experience. Neither Livingston nor Steck observed alteration in serum calcium and phosphorus.

Prompted by the report of Abrams and Bauer, I proceeded to restudy a series of 15 patients who had received or who were receiving vitamin D therapy for arthritis. Seven were receiving active therapy; in eight, therapy had been discontinued. The significant objective findings appear in tables 1 and 2.

DISCUSSION

An examination of the results obtained demonstrates that they are at variance with those of Abrams and Bauer, but are in complete accord with those of Livingston and Steck. In no case did the blood calcium rise to dangerously high levels, and in only one (case No. 20) was there an elevation of the serum calcium level above 11.27 mg. per cent. In most patients the blood calcium level was less than 10 mg. per cent, even after the administration of large doses of vitamin D for many months or years.

It has been the experience of the writer and that of others that the benefit derived from this vitamin D preparation in the treatment of arthritis cannot be obtained with ordinary ultraviolet-irradiated ergosterol or certain other forms of vitamin D. This observation, together with the fact that Ertron has been shown not to produce the elevation of the blood serum calcium so characteristic of other forms of vitamin D, has led us to subscribe to the thought that vitamin D, as we know it, is not a distinct chemical entity but is probably a group of substances, each component of which is capable of curing experimentally produced rickets in the rat. It is the contention of the writer that the property of antirachitic potency in no way reflects the chemical nature of the vitamin D under observation, and gives no indication of other substances which might be present and which might exert an entirely different pharmacodynamic influence. Following this line of reasoning, it seems clear that not all forms of vitamin D influence the level of blood serum calcium and phosphorus in an identical manner. Furthermore, it seems apparent that the dosage of a given preparation measured in terms of antirachitic potency is no indication of its toxic potentialities. This thought appears further substantiated by McCollum, Orent-Keiles, and Day,⁷ who state: "The properties of vitamin D are exhibited by at least eleven different sterol derivatives." Obviously, the designation "vitamin D" does not accurately classify the chemical nature of an antirachitic substance, but merely gives some indication of one of its pharmacologic properties.

This vitamin D preparation is activated from ergosterol by means of an exclusive method (Whittier process), hence differs from the type of vitamin D used by Abrams and Bauer. The conclusion is valid, therefore, that the results reported by Abrams and Bauer are applicable only insofar as the type of vitamin D they

TABLE 2

Case No.	Date of Examination	Hemoglobin (Per Cent)	Erythrocytes (Millions per cmm.)	Leukocytes (Thousands per cmm.)	Sedimentation Rate	Calcium (Mg. per 100 cc.)
1	11-15-37	75	4.43	7.00	13	
	3- 7-38	80	4.15	7.65	12	
	8-23-38	80	4.44	10.50	14	
	11-16-38	80	4.26	7.60	9	9.51
	2-28-39	80	4.16	10.15	11	9.90
2	11-13-37	90	4.78	7.60	8	
	8-23-38	90	4.85	8.70	7	
	11-21-38	90	5.08	7.15	5	9.71
	2-11-39	90	4.96	10.00	5	9.42
3	11-15-37	85	4.69	14.90	20	
	8- 6-38	85	4.51	10.60	16	
	11-15-38	80	4.58	11.15	18	10.2
	2-28-39	80	4.92	10.15	16	10.0
4	11-13-37	90	4.61	13.45	19	
	3- 5-38	90	4.77	9.20	7	
	7-30-38	90	4.90	10.50	21	
	11-19-38	80	4.28	10.65	18	9.51
	2-25-39	80	4.78	10.50	15	9.48
5	11-15-37	90	4.58	7.20	13	
	3- 4-38	85	4.57	6.40	13	
	11-22-38	80	4.34	8.80	10	9.51
	2-28-39	85	4.40	8.10	7	9.50
6	11-11-37	85	4.38	15.40	20	
	3- 8-38	85	4.58	9.70	18	
	8-20-38	85	4.43	14.70	20	
	11-17-38	85	4.57	17.80	18	9.71
	2-27-39	90	5.58	15.80	14	9.90
8	11-16-37	90	4.92	10.85	13	
	3-11-38	85	4.58	7.80	22	
	9- 8-38	85	4.39	10.10	16	
	11-18-38	80	4.35	7.00	13	9.42
	2-10-39	90	4.64	7.60	13	9.81
9	11-13-37	85	4.66	6.70	16	
	8-22-38	90	4.66	8.70	15	
	11-16-38	90	4.62	9.35	12	9.80
	3-22-39	90	4.63	9.90	12	10.27
10	11-15-37	75	4.38	8.40	32	
	3-22-38		3.04	4.80	32	
	8-30-38	90	4.69	11.30	30	
	12- 5-38	80	4.68	10.40	29	9.39
	3-13-39	90	4.68	8.90		10.51
11	11-12-37	75	3.77	8.30	32	
	3- 2-38	85	4.44	8.60	28	
	8-15-38	75	3.87	7.35	31	
	11-17-38	80	4.18	12.75	35	10.59
	2-16-39	90	4.88	17.00	32	9.71
12	11-13-37	85	4.59	11.70	10	
	3- 7-38	85	4.49	6.40	7.5	
	8- 5-38	85	4.67	10.00	10	
	11-19-38	80	4.16	6.80	8	11.27
	3-11-39	85	4.26	7.45	5	9.49
16	11-30-37	65	4.25	9.20	28	
	3- 9-38	70	4.11	7.00	23	
	8-26-38	90	4.69	9.60	27	
	12-20-38	85	4.34	9.90	24	9.19
	3-16-39	80	4.29	11.20	23	9.08
17	11-20-37	90	5.02	11.00	10	
	8-26-38	90	4.50	8.80	5	
	11-15-38	90	4.69	6.70	7	9.61
	2-15-39	90	4.72	6.60	3	9.52
19	11-20-37	80	4.22	8.90	19	
	11-20-38	90	4.71	8.00	16	10.29
	3-12-39	85	4.63	11.70	26	9.08
20	11-20-37	90	5.48	9.70	16	
	3- 5-38	80	4.26	11.30	5	
	8-29-38	75	4.10	9.20	19	
	12- 3-38	75	3.92	9.00	12	12.02
	3- 9-39	85	4.45	11.90	10	10.00

employed is concerned, and are possibly not applicable to vitamin D obtained by any other process. Experimental studies are now being carried on to establish differences and, if possible, means of differentiation between various forms of vitamin D.

SUMMARY

In the treatment of 15 arthritic patients with this vitamin D preparation, no toxic reactions occurred;

serum calcium levels were not elevated beyond normal limits.

The unqualified designation "vitamin D" is inaccurate and incomplete, since it makes no allowance for the differences in toxicity that are known to exist between the various forms of vitamin D. The method of activation appears to be the responsible agent in the production of the unknown substances which produce elevation of the blood serum calcium and which are responsible apparently for the subjective symptoms of intolerance.

Book Reviews

Urology, by DANIEL N. EISENDRATH, M.D., consulting urologist to the American Hospital, Paris, France, and HARRY C. ROLNICK, M.D., attending urologist, Michael Reese, Mt. Sinai, and Cook County Hospitals, Chicago; 1061 pages, with 762 illustrations; Philadelphia: J. B. Lippincott Company, 1938. Price, \$10.00.

This is the fourth edition of this volume which represents an authoritative and complete presentation of the entire field of urology. The authors are aided by Stein and Muschat in the chapters on gonorrhea in the female and on the neurogenic dysfunction of the bladder. The entire treatise is well written and outlined and is thorough enough to appeal to the busy practitioner and the urologist. Of value to the general practitioner are the chapters on genito-urinary tract infections which deal with the newer knowledge of diagnosis and treatment and the chapters on sex neuroses, undescended testicle, and nephritis. Minor urological technique is covered thoroughly.

The chapters on operative technique and postoperative treatment are especially recommended to the urologist and general surgeon, being a lucid and adequate presentation of the entire field of urologic surgery, with numerous illustrations of procedures which have proved to be of practical value to the authors and their associates.

Urinary tract anomalies and the subject of bladder neck obstruction have been carefully presented by the authors who are recognized by their extensive studies in these fields.

Diseases of the Nose, Throat and Ear, by W. WALLACE MORRISON, M.D., clinical professor and chief of department of otolaryngology, New York Polyclinic Medical School and Hospital; 675 pages with 334 illustrations; Philadelphia: W. B. Saunders Company, 1938. Price, \$5.50 net.

This volume is a compilation of material gathered and organized from Dr. MORRISON's teaching. It is written to serve the undergraduate medical student and the general practitioner. The author's objective is to be practical, to state all necessary facts in order to clarify the subject, and to enable the student and practitioner to apply this knowledge for the aid of the sick. A short resume of the essential points in surgical anatomy is given in each section of the book. This is immediately followed by the physiological considerations of the parts concerned. When the etiology of the disease is known, it is stated simply. Pathological conditions are described and are illustrated. The signs and symptoms of each clinical entity are listed in their order of appearance and importance. Methods of examination are described and illustrated so the student and the general practitioner may learn to make a complete and satisfactory physical examination. Diagnoses are presented and prognosis is discussed. The simpler operations in this field are fully described and illustrated. The outstanding features of this book are two: namely, data are simple and practical.

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Infections of the Hand, by ALLEN B. KANAVAL, M.D., Sc.D., F.A.C.S., late professor of surgery, Northwestern University Medical School; 7th edition, thoroughly revised, 503 pages, 299 engravings; Philadelphia: Lea & Febiger, 1939. Price, \$6.00.

This is the last written work of the late ALLEN B. KANAVAL. The rearrangement of its contents in this edition makes for a better presentation of the subject. The addition of several detailed illustrations aids materially in clarifying the anatomy of the hand and forearm in relation to infection in these structures.

The author emphasizes that the adequate care of open injuries to the hands consists of cleanliness, using soap and water, using irrigations of the wound and complete debridement where it is possible to be carried out. It is pointed out that antiseptics cause cell and tissue death in a clean wound, thereby defeating the purpose for which they are employed.

The use of elevation, adequate immobilization of the part and bed rest are still advocated by the author in the treatment of infection, just as he has continuously done since the first edition of this monograph.

The diagnosis and methods of treatment for the various infections of the hand and forearm as advanced in this work have been arrived at by a rational consideration of the anatomy of the part and of the pathology produced. Any physician having to manage these infections will find valuable information in this volume that will be helpful. The place of incising for the evacuation of pus in the spaces of the hand and forearm is clearly described and diagramed.

Textbook of Anatomy and Physiology, by DIANA CLIFFORD KIMBER, CAROLYN E. GRAY, A.M., R.N., and CAROLINE E. STACKPOLE, A.M.; 10th edition, revised and rewritten, blue fabrikoid, gold-stamped, 604 pages plus references, glossary and index, 276 figures; New York, the Macmillan Co.: 1938. Price, \$3.00.

This is a textbook for student nurses, written with the contention that it is a good thing for such students to study anatomy and physiology simultaneously. Hence, anatomy is presented in association with physiology in this work, which begins with a discussion of hygiene, proceeds to the somatic cells, tissues, and organs, the skeletal system, circulatory system, the ductless glands, and concludes by describing the sensory organs and the reproductive system. The book is exceptional in that certain subjects and technics, usually considered too simple for inclusion in more pretentious textbooks of this type, are thoroughly and clearly explained. Some of the line drawings are augmented by color, an arrangement useful to the student in distinguishing parts of the body, different systems, and structural details.

The subject material is said to conform to that recommended in the course in anatomy and physiology of the curriculum of the National League of Nursing Education. Dr. George W. Corner, of the University of Rochester, assisted in the preparation of the chapters on embryology and the reproductive system. Miss Gray has been associated with City Hospital, New York City, and Miss Stackpole is associate in biology, Columbia University Teachers College.

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MINNEAPOLIS, MINN., SEPTEMBER, 1939

LIFE PRECEDES LIFE

Would it not be interesting to know who and where each of us was, say one or two thousand years ago? Some, to be sure, do not seem to care. We find in history-taking that patients cannot always give their own anamnesis; and when it comes to the family history, they are at a loss to give the ages of grandparents or even of parents. This slothful but exceedingly common type of indifference must make the paleontologist frown. While he is searching fossil remains for evidence of the earliest animal life on our planet, the present living individual can rarely trace his ancestry for the past 100 years.

Is it not rather indecent not to know what one is made of? Whether mongrels or thoroughbreds, we should know something about our forebears. We wager that astrological predictions would have to take a back seat if the individual knew more about his mundane chromosomes. Let us hope that some practical-minded genealogist will get out a family history book that can

be distributed at small cost to each family for the benefit of future generations.

A. E. H.

THE TRAINING AND DEVELOPMENT OF THE PHYSICIAN IN HUMAN CONTACTS

It is common talk in medical circles today that the members of the medical profession do not enjoy the respect and honor which was accorded their predecessors in the profession. While this is probably not true, the fact remains that in this day of the urbanization of a large part of our population and of specialization in medicine, the average physician has lost much in human contacts which his predecessor, the old family doctor, had. The family doctor knew each member of the family, often from birth. He knew the individual's failings and fine points. He even knew the family fields and the family horses. He knew what each individual member of the family had to fight. On the other hand, in modern times there has been so much technical knowledge to master that many men are leaving medical school

with a superb technical training and very little knowledge of the human heart or the things that men live by. And what is worse, some of the members of our profession never seem to acquire this knowledge. We have left too much to our psychiatrists and there are not enough good psychiatrists to go around. And even if there were they would probably be more or less concentrated in the cities. So that it is obvious that the general practitioner and the internist especially must fit into the lives of their everyday patients as does the psychiatrist in his very special way into the lives of his maladjusted patients. And one wonders as one sees the younger men come into active work each year just how much training our medical students and interns and practicing physicians are getting in this very important matter of human relations. And how can they be so trained?

In the first place, it is evident that any doctor may mean more to his patients if he knows something of the world's history, of the long weary trek which mankind has traveled to get to what we are wont to call modern civilization. Of course, as we see the world again preparing for war, as we see racial and religious intolerance rampant, we cannot but wonder whether we may not be back-tracking. Nevertheless, there are bits of history every doctor should know; there are books and pictures and music that the world has lived by down through the ages, and the doctor can mean more to his patients if he knows something of the beauty that a few rare spirits have found and have interpreted for us.

Of course, after all is said and done, no amount of training either cultural or technical can take the place of character or of an essential kindness and tact which must be a part of the armamentarium of every physician who is to enter really into the lives of his patients. There are so many things that sick people may need more than they need medicine, perhaps even more than they need extensive laboratory study. And this is not intended to decry in any way the value of scientific diagnosis or the value of careful laboratory study. People come to the doctor with their troubles, mental and emotional, as well as physical, and many times a little decent human understanding is more important than the diet or medicine which he may prescribe. Sometimes the light in the doctor's eye may be a very important thing about him in bringing his patient back to physical and mental health, in giving him a new outlook, and in lifting the load from his tired shoulders.

We thoroughly fear the political control of medicine, but in just so far as we are helping to humanize the practice of medicine, in just so far as we are training our young doctors in the art of understanding the human heart, in just so far as we decrease the very small percentage of medical bandits whom we have in our midst, and replace them with understanding and kindly physicians, are we going to retain the confidence of our people and make political control of medicine in this country very difficult, if not impossible.

H. W. G.

THE VETERINARIAN AND DISEASE CONTROL

The article in this issue of *THE JOURNAL-LANCET* entitled, "Infectious Equine Encephalomyelitis," by Dr. Charles E. Cotton is an example of the rôle which the veterinarian plays in the control of disease not only in animals but also in man. Here Dr. Cotton sums up the subject in all of its phases and emphasizes especially the transmissibility of this disease to man. He calls attention to the importance of controlling this disease in animals, particularly horses, and presents much information which every physician should have with reference to the disease in man.

Since the first veterinary school was opened in Lyons, France, in 1762, one of the major activities of the profession has been to protect human beings against diseases of animals. In doing so, many veterinarians have lost their lives through contracting diseases from animals, such as glanders, anthrax, erysipelas of swine, rabies, undulant fever, and tuberculosis. Many others have been invalidated over varying periods of time from animal diseases. Some have died from injuries sustained while treating domestic animals.

Despite all this, the veterinarian has pressed forward and has controlled disease transmissible from animals to man in such a manner that much of the good health which this nation enjoys is due to his efforts. There was a time when the veterinarian was referred to as the "horse doctor" or the "cow doctor," when he was looked down upon by members of the medical profession. Since the first veterinary school was opened in the United States at Ames, Iowa, in 1879, the standards of veterinary education have constantly increased until today the regular four-year course in veterinary medicine is preceded by one year of college work and in many instances by two. Indeed, today the veterinarian is among the best educated persons in his community. Everywhere the veterinarians work hand in hand with the medical profession. They are called upon to speak before medical organizations and any medical man should look upon it as a high honor to be called upon to speak before a veterinary organization.

In addition to the enormous volume of practical work which the veterinarians do for the health of the people and their domestic animals, they have done and are continuing to do some of the finest research of all time. The work of Dr. Cotton and his allies in the protection of man against a disease of horses is not his first great contribution. He played a leading rôle in the control of tuberculosis among the cattle of this nation and just now he is engaged in the solution of another great problem, namely, the control of brucellosis in animals, which must result in the control of undulant fever. Any medical society will do well to have on its program from time to time a veterinarian such as Dr. Cotton.

J. A. M.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON JULY 6, 1939

JUNE EXAMINATION

Name	School	Address
Barnett, Joseph Morton	U. of Minn., M.B. 1938	1117 Upton Ave. N., Minneapolis, Minn.
Birnberg, Victor Jack	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Blackwell, William Joseph	Northwestern, M.B. 1935, M.D. 1936	Mayo Clinic, Rochester, Minn.
Blomberg, Robert David	U. of Minn., M.B. 1939	Hurley Hospital, Flint, Mich.
Brooke, James William	U. of Ore., M.D. 1938	Lancaster, Minn.
Burks, James Willis, Jr.	Washington U., Mo., M.D. 1937	Mayo Clinic, Rochester, Minn.
Christiansen, Harold Aug.	U. of Minn., M.B. 1938, M.D. 1939	502 Oak St. S. E., Minneapolis, Minn.
Coulter, Everett Benjamin	U. of Minn., M.B. 1939	Mpls. General Hospital, Minneapolis, Minn.
Coventry, Markham Bingham	U. of Mich., M.D. 1937	Mayo Clinic, Rochester, Minn.
Craig, David Mark	U. of Minn., M.B. 1939	Milwaukee County Hosp., Wauwatosa, Wis.
Cronin, Donald Joseph	U. of Minn., M.B. 1939	Mpls. General Hospital, Minneapolis, Minn.
Douglas, Kenneth Wallace	U. of Minn., M.B. 1939	Tacoma General Hospital, Tacoma, Wash.
Engstrom, William Weborg	U. of Minn., M.B. 1939	3000 Humboldt Ave. N., Minneapolis, Minn.
Fink, Daniel Louis	U. of Minn., M.B. 1938	3407 Lyndale Ave. S., Minneapolis, Minn.
Fogarty, Charles William, Jr.	U. of Minn., M.B. 1938	1826 Summit Ave., St. Paul, Minn.
Forsythe, James Robert	U. of Minn., M.B. 1939	Kings County Hospital, Brooklyn, N. Y.
Fredricks, Merriam Gerard	U. of Minn., M.B. 1939	Milwaukee County Hosp., Wauwatosa, Wis.
Goehrs, Gilman Henry	U. of Minn., M.B. 1938	118—16th Ave. S., St. Cloud, Minn.
Haisten, Arnold Sessions	U. of Pennsylvania, M.D. 1936	Mayo Clinic, Rochester, Minn.
Hampton, Hiram Phillip	Emory U., M.D. 1937	Mayo Clinic, Rochester, Minn.
Hay, Lyle Joseph	U. of Minn., M.B. 1937, M.D. 1938	University Hospital, Minneapolis, Minn.
Heckel, Donald Q.	U. of Minn., M.B. 1939	San Bernardino Co. Hosp., San Bernardino, Calif.
Jacobson, Charles Edward, Jr.	Cornell U., M.D. 1935	Mayo Clinic, Rochester, Minn.
Jacobson, Wyman E.	U. of Minn., M.B. 1939	Hurley Hospital, Flint, Mich.
Kaplan, Harry Arthur	U. of Minn., M.B. 1937	213 W. 3rd St., Duluth, Minn.
Kelly, Clarence Andrew	Marquette U., M.D. 1939	Dresser Junction, Wis.
Kelsey, Chauncey Miller	U. of Minn., M.B. 1939	Hinckley, Minn.
Koskela, Lauri Edwin	U. of Minn., M.B. 1938	Rood Hospital, Coleraine, Minn.
Lindert, Merlyn Carl Fred	U. of Minn., M.B. 1938	Milwaukee County Hosp., Wauwatosa, Wis.
Lindley, Stanley Bryan	U. of Minn., M.B. 1938	515 Delaware St. S. E., Minneapolis, Minn.
MacMillan, David Glenn	U. of Minn., M.B. 1939	St. Mary's Hospital, Duluth, Minn.
MacPherson, Malcolm Morrison	U. of Manitoba, M.D. 1935	Mayo Clinic, Rochester, Minn.
Magner, Charles Edgar	Rush Med. Col., M.D. 1938	Malta, Mont.
Monserud, Nels Ordell	Rush Med. Col., M.D. 1938	Raiter Hospital, Cloquet, Minn.
Mooney, Robert Davis	U. of Minn., M.B. 1938	418 Beacon Ave., St. Paul, Minn.
Morrison, William Forster	U. of Minn., M.B. 1938	1017—18½ Ave. N. E., Minneapolis, Minn.
Musachio, Nicholas Frank	U. of Minn., M.B. 1938	Eden Valley, Minn.
O'Leary, John Hall	U. of Minn., M.B. 1938	709 E. 14th St., Minneapolis, Minn.
Phalen, George Smith	Northwestern, M.B. 1937, M.D. 1938	Mayo Clinic, Rochester, Minn.
Raszkowski, Harvey Joseph	U. of Wis., M.D. 1936	Mayo Clinic, Rochester, Minn.
Richardson, Robert Joseph	U. of Minn., M.B. 1938	Rushford, Minn.
Satory, John Joseph	U. of Minn., M.B. 1938	Wabasha, Minn.
Schwzyer, Hanns Carl	U. of Minn., M.B. 1938	8 Crocus Hill, St. Paul, Minn.
Selmo, Joseph	Loyola U., M.D. 1939	Box 16, Caspian, Mich.
Sickels, Edward Worman	U. of Minn., M.B. 1939	Harper Hospital, Detroit, Mich.
Stewart, Marvin Jerome	U. of Minn., M.B. 1939	Miller Hospital, St. Paul, Minn.
Stoen, Harold Jennings	Rush Med. Col., M.D. 1936	U. S. Marine Hospital, Cleveland, Ohio.
Swenson, Orrin Endre	U. of Wis., M.D. 1938	419 N. Prairie St., Stoughton, Wis.
Trow, James Edward	U. of Minn., M.B. 1939	Charity Hospital of La., New Orleans, La.
Veranth, Leonard Anthony	Marquette U., M.D. 1939	7 W. Sheridan St., Ely, Minn.
Weisman, Sydney Jerald	U. of Minn., M.B. 1939	Buffalo City Hospital, Buffalo, N. Y.
Weismann, Rodger E.	U. of Iowa, M.D. 1938	Houston, Minn.
Westrup, John Edward	Marquette U., M.D. 1939	Maple Lake, Minn.
Williams, Bill Henry	U. of Minn., M.B. 1937, M.D. 1938	University Hospital, Minneapolis, Minn.
Williams, John Alexander	U. of Minn., M.B. 1939	St. Mary's Hospital, Duluth, Minn.
Zinter, Ferdinand A.	U. of Minn., M.B. 1938	600 Phys. & Surg. Bldg., Minneapolis, Minn.

BY RECIPROCITY

Clark, Richardson Evans	U. of Iowa, M.D. 1936	Spring Valley, Minn.
Eyres, Thomas Edward	U. of Iowa, M.D. 1932	Pequot, Minn.
Pewters, John Thomas	U. of Minn., M.B. 1937, M.D. 1938	1620 W. 32nd St., Minneapolis, Minn.
Witherspoon, Jackson Thornwell	Johns Hopkins U., M.D. 1928	84 S. 10th St., Minneapolis, Minn.

NATIONAL BOARD CREDENTIALS

Cunningham, Bernard Poland	New York Univ., M.D. 1936	Mayo Clinic, Rochester, Minn.
Olson, Lorin Magnus	Northwestern, M.B. 1938, M.D. 1939	Chisago City, Minn.

William James Mayo

William James Mayo, M.D., M.D. in Surgery, LL.D., D.Sc., F.A.C.S., F.R.C.S. (England), F.R.C.S. (Ireland), F.R.C.S. (Edinburgh), F.R.S.M. (London), was born at LeSueur, Minnesota, on June 29, 1861, the eldest son of Dr. William Worrall Mayo. He was taken to Rochester at the age of one and a half years by his parents, was graduated from the Rochester High School at the age of sixteen, and attended Niles Academy. In 1883 he received the degree of Doctor of Medicine from the University of Michigan, and in 1890 the same institution awarded him the degree of Master of Arts. He was certificated by the New York Post-Graduate Medical School in 1884; and received the degree of Doctor of Medicine in 1885 from the New York Polyclinic Medical School and Hospital. From 1906 onward he was awarded honorary degrees, medals, decorations, and various memberships by universities, special societies, and heads of governments in nearly every part of the world, from Serbia and Finland to Peru and New Zealand.

President of the Minnesota State Medical Association in 1895-1896, Dr. Mayo in 1899 became a member of the first board of editors of the old *St. Paul Medical Journal*, in which endeavor he was associated with such physicians as William Osler, H. Longstreet Taylor and Richard C. Cabot, all of whom served the aforementioned journal. Dr. Mayo from the beginning of his career was deeply concerned in the progress and quality of medicine and medical practice in the state of his birth. He first attended a meeting of the American Medical Association in 1882, while he was still a medical student, the meeting that year being held in St. Paul. He entered into medical practice in 1883, in association with his father in Rochester, his certificate of licensure bearing the date November 12, 1883. His younger brother, the late Charles Horace Mayo, joined him in practice in 1888. In 1915, when it became apparent that the experience and resources of the group of physicians headed by William J. and Charles H. Mayo offered opportunities to physicians for special postgraduate study not available elsewhere within any miles of the state of Minnesota, The Mayo Foundation for Medical Education and Research was endowed by the two brothers and was established as one unit of the Graduate School of the University of Minnesota.¹ Four Fellows of the Foundation were awarded university degrees in 1917.

Following his elevation to the presidency of the American Medical Association in 1906, Dr. Mayo was chosen head of many organizations in the years thereafter. He was president of the Society of Clinical Surgery, 1911-1912; of the American Surgical Association, 1913-1914; of the American College of Surgeons, 1917-1919; of the Congress of American Physicians and Surgeons, 1925; and of the Inter-State Postgraduate Medical Association of North America, 1932-1933. He was a Regent of the University of Minnesota from 1907 until his death, and, like his brother, Charles H. Mayo, was a major, then colonel, in the United States Army Medical Corps during the World War, and a brigadier general in the Auxiliary Reserve Corps from 1921 until his death. He received the Distinguished-Service Medal under General Order No. 69, War Department, 1919.

Dr. Mayo was awarded the gold medal of the National Institute of Social Sciences in 1918; the Henry Jacob Bigelow gold medal of the Boston Surgical Society in 1921; the Royal Order of Commander of the Northern Star (Sweden) in 1927; the Finlay Congressional Dis-

tinguished Service Medal of the Republic of Cuba in 1929; the gold medal (past president's) of the American Medical Association in 1930; the Cross of Knight Commander of the Royal Order of the Crown of Italy in 1932; the bronze medal of the Inter-State Postgraduate Medical Association of North America in 1936; and others.

So much has been said and written about Dr. Mayo and so many tributes were tendered him during his lifetime that many issues of THE JOURNAL-LANCET would be required to print them *in extenso*. They have ranged from such a simple but impressive statement of fact as "He was the greatest man I ever knew," said by Dr. William David Haggard, clinical professor of surgery in the Vanderbilt University School of Medicine and president of the American Medical Association in 1925, to "Will Mayo, the human dynamo, philosopher, planner, doer, and intolerant of half-way methods or part powers . . ."², written by the late Dr. Franklin H. Martin, co-founder and managing director of the American College of Surgeons.

Dr. Mayo was a Fellow of the Royal Society of Medicine (England), the Royal College of Surgeons (England), the Royal College of Surgeons (Ireland), and the Royal College of Surgeons (Scotland), foreign associate of the Académie de Médecine de France, academician of the Accademia Reale Medica di Roma, and Honorary Fellow of the College of Physicians of Philadelphia. He was a member of the honorary academic fraternities Alpha Omega Alpha, Phi Beta Kappa and Sigma Xi.

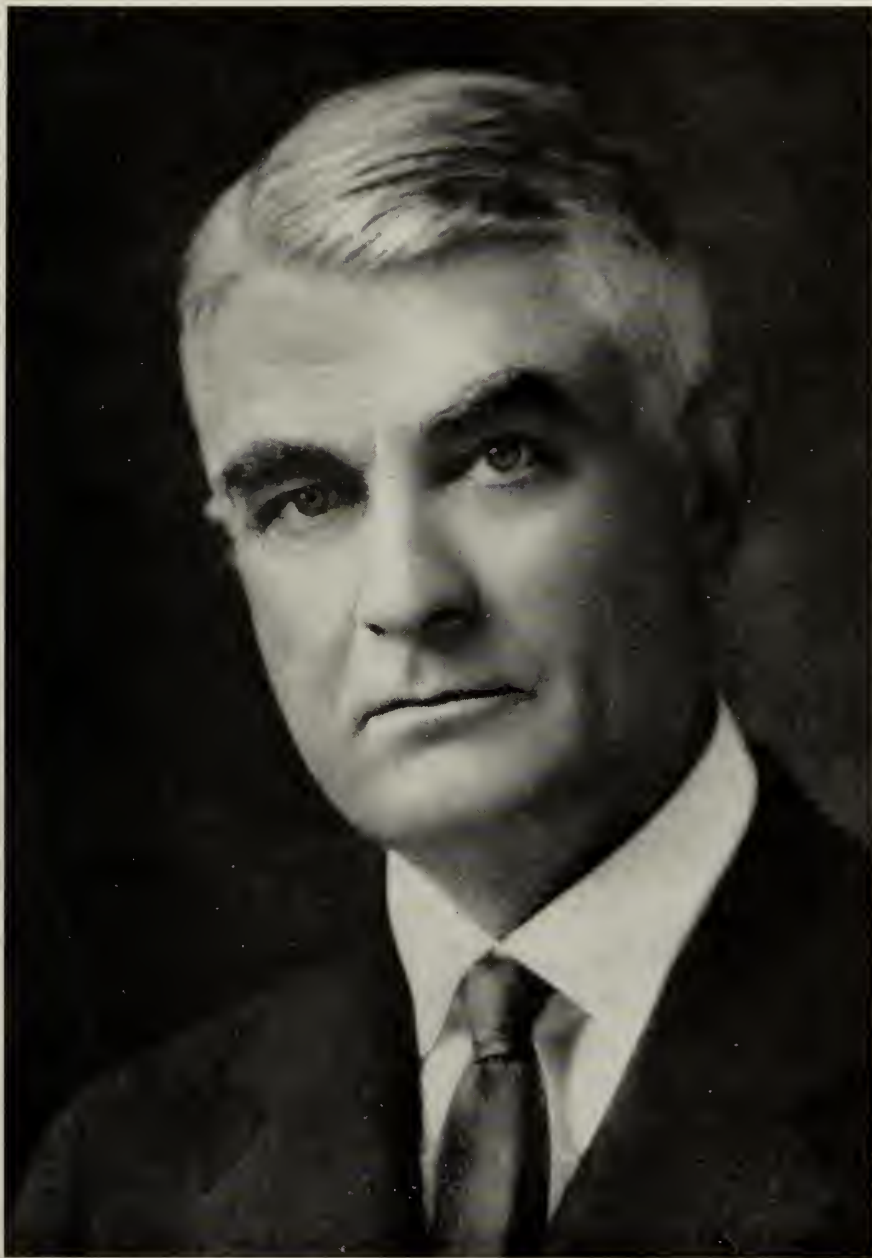
Dr. Mayo was associate foreign member, corresponding member or honorary member of forty-four medical organizations in Argentina, Brazil, Denmark, Ecuador, England, Finland, France, Germany, Ireland, Italy, Mexico, New Zealand, Peru, Scotland, Spain, the United States, Uruguay and Yugoslavia. For many years he maintained membership in the Minnesota Academy of Medicine, the Minnesota Academy of Science, the Minnesota Pathological Society, the Minneapolis Surgical Society and the Southern Minnesota Medical Association.

In 1931, the Honorary Secretary of the Royal Australasian College of Surgeons wrote to Dr. Mayo, in part as follows: "It is the desire of the Council of the College to confer its Honorary Fellowship upon you. As, unfortunately, this cannot be conferred in absentia, the Council trusts that, at some not distant date, you may be able to pay another visit to Australia and thus give the College the opportunity to honour you as it desires." Great traveller that he was, it seemed likely that Dr. Mayo would visit Australia in his later years but his death prevented this and the fellowship, the offer of which pleased him greatly, was not actually conferred.

Dr. Mayo died at Rochester on July 28, 1939. The body lay in state at Mayo Foundation House on Sunday, July 30, and was interred on the afternoon of the same day at Oakwood Cemetery in Rochester, where his father, William Worrall Mayo, and his brother, Charles Horace Mayo, are buried.

REFERENCES

1. Bulletin No. 27, Graduate School, University of Minnesota, (Aug.) 1916.
2. Martin, F. H.: Digest of the proceedings of the Council of National Defense during the World War, 73rd Congress, 2nd session, Senate Document No. 193, ed. 1, Washington, Government Printing Office, 1934, p. 478.



William James Mayo
1861-1939

CAT.

Future Meetings

FIFTIETH ANNIVERSARY OF THE MEDICAL SCHOOL OF THE UNIVERSITY OF MINNESOTA

October 12, 13, 14, 1939

THEME: *Some Trends in Medical Progress
with Particular Reference to Chemistry in
Medicine.*

Anniversary Celebration

Half a century ago three private medical schools in Minneapolis and St. Paul turned over their charters and their properties to the Regents of the University of Minnesota. This occurred not by mere chance, but because of the untiring and statesmanlike efforts of a group of physicians, headed by Dr. Perry H. Millard, who envisioned for the State of Minnesota a single, strong, progressive Medical School as part of the State University.

The development of this school over its first half century—less than the life span of a single individual—has far exceeded the hopes and expectations of its founders. To take stock of progress to date, to pay tribute to the founders of the School and the builders of its name and to cast glances toward the future the special program herein described has been arranged.

The scientific sessions have been planned primarily for alumni, students, faculty, and other physicians, and scientists in related fields. To the University Convocation on Thursday morning and the General Session in Northrop Auditorium on Thursday evening the general public is especially invited; but all who are interested are cordially welcome to attend any of the sessions.

Schedule of Events

Monday to Wednesday, October 9, 10, 11—Medical Clinics arranged by Division of Postgraduate Medical Education.

Thursday, Friday, October 12, 13—Special Anniversary Program.

Saturday Morning, October 14—Anniversary Clinics.

Saturday Afternoon, 2:00 O'Clock—Football game, Purdue University vs. University of Minnesota, Memorial Stadium.

PROGRAM

for the Commemoration of the Fiftieth Anniversary of the Founding of the Medical School of the University of Minnesota

Thursday, October 12, 1939

Morning Session, 9:00 O'Clock
Auditorium of Music Building

"The Colloid Chemistry of Membranes in Living Organisms"—Herbert M. Freundlich, distinguished service professor, University of Minnesota.

"The Performance of Osmotic Work in Living Systems"—Maurice B. Visscher, professor of physiology, University of Minnesota.

"Some Reactions by Which Solutes May Be Differentially Concentrated by the Kidney"—John P. Peters, professor of medicine, Yale University.

"Medical Education, Research, and the Public Health"—Thomas Parran, Jr., surgeon-general, United States Public Health Service (University Convocation Address, 11:30 a. m., Northrop Auditorium).

Luncheon Round-Table Discussions, 12:30 O'Clock
Minnesota Union

"The Clinical Significance of Water and Electrolyte Balances."

"Blood Regeneration in the Anemias."

"Clinical Problems of Thrombosis."

"Current Trends in Public Health."

Afternoon Session, 2:30 O'Clock
Northrop Auditorium

"Organic Chemistry in the Pursuit of Vitamin Research"—Lee I. Smith, professor of organic chemistry, University of Minnesota.

"Investigations in Metabolism of the Fatty Acids"—George E. Burr, professor of physiological chemistry and botany, University of Minnesota.

"Production, Utilization and Significance of Blood Proteins" (annual lecture of the Minnesota Pathological Society)—George H. Whipple, professor of pathology and dean of the medical school, University of Rochester.

"Investigations in the Problem of Thrombosis"—Charles H. Best, professor of physiology, University of Toronto.

Evening Session, 8:00 O'Clock
Northrop Auditorium

"Medicine and the Commonwealth"—The Honorable Harold E. Stassen, Governor of the State of Minnesota.

"The Place of Medicine in a University"—Guy Stanton Ford, president, University of Minnesota.

"The Role of the Fundamental Sciences in Medical Progress" (the first Elias Potter Lyon lecture)—Anton J. Carlson, distinguished service professor of physiology, University of Chicago.

Friday, October 13, 1939

Morning Session, 9:00 O'Clock
Northrop Auditorium

"Microbic Respiration"—A. J. Kluyver, professor of microbiology, Delft, Holland.

"The Biology of Animal Virus Diseases"—Robert G. Green, professor of bacteriology, University of Minnesota.

"Observations upon the Mode of Action of Sulfanilamide and Its Derivatives"—Perrin H. Long, associate professor of medicine, Johns Hopkins University.

"Chemistry in Urinary Antisepsis"—Henry F. Helmholtz, professor of pediatrics, The Mayo Foundation, University of Minnesota.

Luncheon Round-Table Discussions, 12:00 O'Clock
Minnesota Union

"Chemotherapy".

"Clinical Aspects of the Vegetative Nervous System."

"Clinical Physiology of the Gastro-Intestinal Tract."
 "Neurophysiology".
 "Recent Advances in Bacteriology."

Afternoon Session, 2:00 O'Clock
Auditorium of Music Building

"The Chemical Approach to the Problem of Convulsive Mechanisms"—Irvine McQuarrie, professor of pediatrics, University of Minnesota.

"Methods of Analysis of Nervous Action"—Herbert S. Gasser, director, Rockefeller Institute for Medical Research.

"The Nervous System in the Regulation of Visceral Processes"—Detlev W. Bronk, professor and director, Institute of Neurology, University of Pennsylvania.

"The Argument for Chemical Mediation of Nerve Impulses" (the annual Alpha Omega Alpha lecture)—Walter B. Cannon, professor of physiology, Harvard University.

Evening Session, 6:30 O'Clock
Ballroom, Minnesota Union

"The Medical School of the University of Minnesota in Retrospect and Prospect"—Harold S. Diehl, dean of the medical sciences, University of Minnesota.

"The Medical School from the Point of View of the Alumni" (the Herman M. Johnson lecture of the Minnesota State Medical Association)—Olaf J. Hagen, Class of 1906, Moorhead, Minnesota.

"Graduate Medical Education"—Donald C. Balfour, director, The Mayo Foundation, University of Minnesota.

Presentation of Distinguished Service Award of Minnesota State Medical Association Posthumously to Dr. William J. Mayo, Dr. Charles H. Mayo, and Dr. Herman M. Johnson—Dr. George Earl, president of the Minnesota State Medical Association.

"Progress in Medical Education on the American Scene"—Richard E. Scammon, distinguished service professor, University of Minnesota.

Saturday, October 14, 1939

Morning Session, 9:00 O'Clock
Amphitheater, University Hospital

Anniversary Clinics

"The Surgical Consideration of Essential Hypertension"—Alfred W. Adson, professor of neurosurgery, The Mayo Foundation, University of Minnesota.

"A Physiological and Surgical Critique of the Surgeon's Role in the Management of Peptic Ulcer"—Owen H. Wangensteen, professor of surgery, University of Minnesota.

"Certain Physiologic Concepts Important in the Practice of Cardiology"—Arlie R. Barnes, professor of medicine, The Mayo Foundation, University of Minnesota.

"Some Disturbances of the Vascular System in Pregnancy"—John L. McKelvey, professor of obstetrics and gynecology, University of Minnesota.

"Sprue and Related Diseases Affecting Intestinal Absorption"—Albert M. Snell, associate professor of medicine, The Mayo Foundation, University of Minnesota.

"Jaundice Due to Cancer"—Cecil J. Watson, associate professor of medicine, University of Minnesota.

AMERICAN CONGRESS ON OBSTETRICS AND GYNECOLOGY

The American Congress on Obstetrics and Gynecology will be held in Cleveland, Ohio, September 11 to 15, 1939. Sponsored by the American Committee on Maternal Welfare, Inc., the Congress is being held for the entire medical profession.

Among the speakers are the following from Minneapolis: Dr. Jalmar H. Simons, Dr. John L. McKelvey, Dr. J. C. Litzenberg and Dr. William A. O'Brien. Dr. F. L. McPhail of Great Falls, Montana, will lead a discussion at the Public Health Section of the Congress.

NORTHERN MINNESOTA MEDICAL ASSOCIATION

The annual meeting of the Northern Minnesota Medical Association will be held at Detroit Lakes, Minnesota, Sept. 8 and 9, 1939. A practical and varied program has been arranged by Dr. C. O. Estrem of Fergus Falls, as follows:

Friday, September 8, 1939

8 A. M. Morning Session

"The Use of Metal in Fractures"—Dr. Joel C. Swanson, Fargo.

"Painful Conditions about the Head and Face"—Dr. Gordon R. Kamman, St. Paul.

"Inhibition Ileus"—Dr. E. A. Heiberg, Fergus Falls.

"Pneumonia in Children"—Dr. R. E. Nutting, Duluth.

"Some Observations on Böhler's Treatment of Fractures"—Dr. B. S. Adams, Hibbing.

"Nasal Obstruction: Is It Allergic?"—Dr. C. L. Oppegard, Crookston.

"Vertigo"—Dr. W. T. Wenner, St. Cloud.

"Tumors of the Myocardium and its covering"—Dr. W. E. Neff, Virginia.

Luncheon

Afternoon Session

"Infectious Diseases of the Thyroid"—Dr. T. O. Young, Duluth.

"Early Gastro-Intestinal Diagnosis"—Dr. George Earl, St. Paul.

"Roentgen Diagnosis in Acute Abdominal Conditions"—Dr. Leo G. Rigler, Minneapolis.

The A. M. A. Meeting—Dr. E. A. Meyerding.

Evening Session

Banquet 6:30 P. M.

Talk—Dr. O. F. Melby, Thief River Falls.

Toastmaster—Dr. E. J. Hirshboeck.

Address: "The Trend of the Times"—Senator A. O. Sletvold, Detroit Lakes.

Saturday, September 9, 1939

8:30 A. M.—Clinico, Pathological and Roentgen Conference—Drs. E. L. Tuohy, George L. Berdez, and J. R. McNutt, Duluth, also by a group of prominent medical men from Rochester.

PROGRAM

INTERNATIONAL MEDICAL ASSEMBLY
INTER-STATE POSTGRADUATE MEDICAL
ASSOCIATION OF NORTH AMERICA

Chicago, Illinois

October 30, 31, November 1, 2 and 3, 1939

Pre-assembly clinics, October 28, post-assembly clinics,
November 4, Chicago Hospitals

MONDAY, OCTOBER 30

8:00 A. M.

Diagnostic Clinic: "Nervous Indigestion"—Dr. Walter C. Alvarez, professor of medicine, University of Minnesota Graduate School of Medicine, Mayo Clinic, Rochester, Minnesota.

Diagnostic Clinic: "Low Back Pain with Sciatica"—Dr. Philip Lewin, associate professor of orthopedic surgery, Northwestern University School of Medicine, Chicago, Illinois.

Diagnostic Clinic: "Clinical Types of Nephritis"—Dr. Soma Weiss, Hersey professor of the theory and practice of physic, Harvard Medical School: physician-in-chief, Peter Bent Brigham Hospital, Boston, Massachusetts.

Intermission for Review of Exhibits

Diagnostic Clinic: "Differential Diagnosis of Lesions of Right Colon"—Dr. Fred W. Rankin, Lexington, Kentucky.

Diagnostic Clinic: "An Evaluation of the Major Operations for Cavernous Pulmonary Tuberculosis"—Dr. John Alexander, professor of surgery, University of Michigan Medical School, Ann Arbor, Michigan.

Noon Intermission

1:00 P. M.

Diagnostic Clinic: "The Use of the Bone Graft in the Treatment of Bone Tumors"—Dr. Dallas B. Phemister, professor of surgery, University of Chicago, School of Medicine, Chicago, Illinois.

Diagnostic Clinic: "The Treatment of Osteo-arthritis"—Dr. Russell L. Haden, Cleveland Clinic, Cleveland, Ohio.

Address: "Surgical Aspects of Peptic Ulcer"—Dr. Eldridge L. Eliason, professor of surgery, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania.

Address: "Symptoms and Diagnosis of Obscure Fever"—Dr. James G. Carr, professor of medicine, Northwestern University School of Medicine, Chicago, Illinois.

Intermission for Review of Exhibits

Address: "Surgical Treatment of Gall-Stones"—Dr. Elliott C. Cutler, Moseley professor of surgery, Harvard Medical School, Boston, Massachusetts.

Address: "Medical Treatment of Liver Disease"—Dr. Albert M. Snell, professor of medicine, University of Minnesota Graduate School of Medicine, Mayo Clinic, Rochester, Minnesota.

Address: "Infections of the Upper Urinary Tract"—Dr. C. Donald Creevy, assistant dean and associate professor of surgery and urology, University of Minnesota Medical School, Minneapolis, Minnesota.

Dinner Intermission

7:00 P. M.

Address: "Allergy as a Factor in General Medicine"—Dr. James H. Black, professor of preventive medicine, Baylor University College of Medicine, Dallas, Texas.

Address: "Management of Ileostomy and Colostomy"—Dr. Richard B. Cattell, Lahey Clinic, Boston, Massachusetts.

Address: "Use of Hormones in Obstetrics"—Dr. Frederick H. Falls, professor of obstetrics and gynecology, University of Illinois College of Medicine, Chicago, Illinois.

Address: "Abdominal Pain in Extra-Abdominal Origin"—Dr. John H. Musser, professor of medicine, Tulane University School of Medicine, New Orleans, Louisiana.

Address: "How Can High Mortality Rate from Skull Fractures be Reduced?"—Dr. Harry Mock, associate professor of surgery, Northwestern University School of Medicine, Chicago, Illinois.

Address: "Treatment of Pellagra and Associated Deficiencies"—Dr. Tom D. Spies, associate professor of medicine, University of Cincinnati College of Medicine, Cincinnati, Ohio.

TUESDAY, OCTOBER 31

8:00 A. M.

Diagnostic Clinic: "Syphilis of the Vascular System"—Dr. James E. Paullin, professor of clinical medicine, Emory University School of Medicine, Atlanta, Georgia.

Diagnostic Clinic: "Fractures of the Femur Treated by Buck's Extension"—Dr. William R. Cubbins, professor of bone and joint surgery, Loyola University School of Medicine, Chicago, Illinois.

Diagnostic Clinic: "Types of Edema and Their Treatment"—Dr. Reginald Fitz, Wade professor of medicine, Boston University School of Medicine, Boston, Massachusetts.

Intermission for Review of Exhibits

Diagnostic Clinic: "Treatment of Increased Intracranial Pressure"—Dr. Eric Oldberg, professor and head of the department of neurology and neurological surgery, University of Illinois College of Medicine, Chicago, Illinois.

Diagnostic Clinic: "Management of Obesity"—Dr. Robert W. Keeton, professor of medicine, University of Illinois School of Medicine, Chicago, Illinois.

Noon Intermission

1:00 P. M.

Diagnostic Clinic: "Diagnosis and Treatment of Tumors of the Intestine"—Dr. W. Wayne Babcock, professor of surgery and clinical surgery, Temple University School of Medicine, Philadelphia, Pennsylvania.

Diagnostic Clinic: "Diseases of the Lungs Simulating Tuberculosis"—Dr. Charles R. Austrian, associate professor of medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland.

Address: "Anomalies of the Lower Urinary Tract"—Dr. Hugh H. Young, professor of urology, Johns Hopkins University School of Medicine, Baltimore, Maryland.

Address: "The Physicians' Interest in Gall-Bladder Disease"—Dr. Alvah H. Gordon, professor of medicine, McGill University Faculty of Medicine, Montreal, Canada.

Intermission for Review of Exhibits

Address: "Indications for Cesarean Section"—Dr. Nicholson J. Eastman, professor of obstetrics, Johns Hopkins University School of Medicine, Baltimore, Maryland.

Address: "Rupture of Intervertebral Disks as a Cause of Low Back Pain and Chronic Recurring Sciatica"—Dr. Alfred W. Adson, professor of neurosurgery, University of Minnesota Graduate School of Medicine, Mayo Clinic, Rochester, Minnesota.

Address: "Cerotherapy in the Treatment of Pneumonia"—Dr. Gerald S. Shibley, associate clinical professor of medicine, Western Reserve University School of Medicine, Cleveland, Ohio.

Dinner Intermission

7:00 P. M.

Address: "Exophthalmos" (The Joseph Schneider Foundation Presentation)—Dr. Albert D. Ruedemann, Cleveland Clinic, Cleveland, Ohio.

Address: "Medical Treatment of Peptic Ulcer"—Dr. Ralph C. Brown, clinical professor of medicine, Rush Medical College, Chicago, Illinois.

Address: "The Management of Intestinal Obstruction"—Dr. Thomas G. Orr, professor of surgery, University of Kansas School of Medicine, Kansas City, Missouri.

Address: "Migraine"—Dr. Harold G. Wolff, assistant professor of medicine, Cornell University Medical College, New York, New York.

Address: "Operability of Carcinoma of the Stomach"—Dr. Verne C. Hunt, clinical professor of surgery, University of Southern California School of Medicine, Los Angeles, California.

Address: "The Present Status of Transurethral Resection"—Dr. Herman L. Kretschmer, clinical professor of surgery (genito-urinary), Rush Medical College, Chicago, Illinois.

WEDNESDAY, NOVEMBER 1

8:00 A. M.

Diagnostic Clinic: "Lesions of the Right Upper Quadrant of the Abdomen"—Dr. William F. Rienhoff, associate professor of surgery, Johns Hopkins University School of Medicine, Baltimore, Maryland.

Diagnostic Clinic: "Rheumatic Fever in Children"—Dr. Robert A. Black, professor of pediatrics, Loyola University School of Medicine, Chicago, Illinois.

Diagnostic Clinic: "Goitre and the Heart"—Dr. Wallace M. Yater, professor of medicine and director of the Department of Medicine, Georgetown University School of Medicine, Washington, D. C.

Intermission for Review of Exhibits

Diagnostic Clinic: "The Present Status of the Surgical Treatment of Peptic Ulcer"—Dr. Howard K. Gray, assistant professor of surgery, University of Minnesota Graduate School of Medicine, Mayo Clinic, Rochester, Minnesota.

Diagnostic Clinic: "Experiences with the Surgical Treatment of Hypertension"—Dr. Loyal Davis, professor of surgery, Northwestern University School of Medicine, Chicago, Illinois.

Noon Intermission

1:00 P. M.

Diagnostic Clinic: Dr. Frank H. Lahey, Lahey Clinic, Boston, Massachusetts.

Diagnostic Clinic: "The Insulins in the Treatment of Diabetes"—Dr. Elliott P. Joslin, clinical professor of medicine, Harvard Medical School, Boston, Massachusetts.

Address: "Treatment of Acute Spreading Peritonitis Following Ruptured Appendix"—Dr. William D. Haggard, professor of surgery, Vanderbilt University School of Medicine, Nashville, Tennessee.

Address: "Newer Approach to the Etiology and Treatment of Angina Pectoris"—Dr. William J. Kerr, professor of medicine, University of California Medical School, San Francisco, California.

Address: "Carcinoma of the Lung"—Dr. Evarts A. Graham, professor of surgery, Washington University School of Medicine, St. Louis, Missouri.

Address: "Dysmenorrhea"—Dr. John R. Fraser, professor of obstetrics and gynecology, McGill University Faculty of Medicine, Montreal, Canada.

Address: "The Hormones of the Gastro-Intestinal Tract"—Dr. Andrew C. Ivy, Nathan Smith Davis professor of physiology and professor of pharmacology, Northwestern University School of Medicine, Chicago, Illinois.

ASSEMBLY DINNER

For members of the profession, their ladies and friends (Informal)

7:00 P. M.

Dr. George W. Crile, president of Inter-State Postgraduate Medical Association of North America, Master of Ceremonies.

Addresses by: Major General James C. Magee, surgeon-general of United States Army, Washington, D. C. Major General Ross T. McIntire, surgeon-general of United States Navy, Washington, D. C. Other distinguished citizens of the world.

THURSDAY, NOVEMBER 2

8:00 A. M.

Diagnostic Clinic: "Malaria and Narcotic Addiction"—Dr. Italo F. Volini, professor of medicine, Loyola University School of Medicine, Chicago, Illinois.

Diagnostic Clinic: "Joint Fractures"—Dr. John J. Moorhead, professor of clinical surgery, New York Postgraduate Medical School, New York, New York.

Diagnostic Clinic: "Modern Aspects of the Diagnosis and Management of Hypertension"—Dr. Roy W. Scott, professor of clinical medicine, Western Reserve University School of Medicine, Cleveland, Ohio.

Intermission for Review of Exhibits

Diagnostic Clinic: "Differential Diagnosis of Tumors of the Breast"—Dr. John F. Erdmann, attending surgeon, New York Postgraduate Medical School, New York, New York.

Diagnostic Clinic: "Clinical Types of Pituitary Disease"—Dr. Walter Timme, professor of clinical neurology, Columbia University College of Physicians and Surgeons, New York, New York.

Noon Intermission

1:00 P. M.

Diagnostic Clinic: "A Presentation of Dermatological Cases"—Dr. Francis E. Seneor, professor of dermatology, University of Illinois College of Medicine, Chicago, Illinois.

Diagnostic Clinic: "Diagnosis and Treatment of Diseases of the Cranial Nerves"—Dr. Walter E. Dandy, adjunct professor of neurological surgery, Johns Hopkins University School of Medicine, Baltimore, Maryland.

Address: "Chemotherapy in the Treatment of Pneumonia"—Dr. Russell L. Cecil, professor of clinical medicine, Cornell University Medical College, New York, New York.

Address: "Clinical and Biological Problems of the Irradiation of the Ovary"—Professor Dott. Emanuele Momigliano, department of obstetrics and gynecology, Royal University of Rome, Rome, Italy.

Intermission for Review of Exhibits

Address: "The Clinical Use of Digitalis"—Dr. Drew W. Luten, associate professor of clinical medicine, Washington University School of Medicine, St. Louis, Missouri.

Address: "Interrelation of the Organs of Internal Secretion"—Dr. Elmer L. Sevringhaus, professor of medicine, University of Wisconsin Medical School, Madison, Wisconsin.

Address: "Vascular and Abdominal Surgery"—Dr. Charles H. Phifer, professor of surgery, University of Illinois School of Medicine, Chicago, Illinois.

Dinner Intermission

7:00 P. M.

Address: "Prevention and Treatment of Virus Disease"—Dr. Thomas M. Rivers, Rockefeller Institute for Medical Research, New York, New York.

Address: "Stricture of the Common and Hepatic Ducts"—Dr. Waltman Walters, professor of surgery, University of Minnesota Graduate School of Medicine, Mayo Clinic, Rochester, Minnesota.

Address and Movie: "Transplantation of the Ureters into the Recto-Sigmoid and Cystectomy for Malignant Tumor of the Bladder"—Dr. William E. Lower, Cleveland Clinic, Cleveland, Ohio.

Address: "Management of the Menopause"—Dr. Emil Novak, associate in gynecology, Johns Hopkins University Medical School, Baltimore, Maryland.

Address and Movie: "The Distended Colon; Its Medical and Surgical Management"—Dr. Claude F. Dixon, associate professor of surgery, University of Minnesota Graduate School of Medicine, Mayo Clinic, Rochester, Minnesota.

Address and Movie: "Fifty Years of Eclampsia, Placenta Previa, and Cesarean Section"—Dr. Joseph B. DeLee, professor emeritus of obstetrics and gynecology, University of Chicago School of Medicine, Chicago, Illinois.

FRIDAY, NOVEMBER 3

8:00 A. M.

Diagnostic Clinic: "Diagnosis of Diseases of the Gall-Bladder"—Dr. Warren W. Cole, professor of surgery, University of Illinois School of Medicine, Chicago, Illinois.

Diagnostic Clinic: "Diet and Nephritis"—Dr. James S. McLester, professor of medicine, University of Alabama School of Medicine, Birmingham, Alabama.

Diagnostic Clinic: "Diagnostic Significance of Pain in the Abdomen"—Dr. Irvin Abell, clinical professor of surgery, University of Louisville School of Medicine, Louisville, Kentucky.

Intermission for Review of Exhibits

Diagnostic Clinic: "Use of Iron, Liver Extract and Desiccated Stomach in the Treatment of Anemia"—Dr. Cyrus C. Sturgis, professor of internal medicine, University of Michigan School of Medicine, Ann Arbor, Michigan.

Diagnostic Clinic: "Is Early Hypertension a Curable Disease?"—Dr. George W. Crile, Cleveland Clinic, Cleveland, Ohio.

Noon Intermission

1:00 P. M.

Diagnostic Clinic: "Diagnostic Features of Chronic Appendicitis"—Dr. George P. Muller, professor of surgery, Jefferson Medical College, Philadelphia, Pennsylvania.

Diagnostic Clinic: "Treatment of Peripheral Vascular Diseases"—Dr. Alton Ochsner, professor of surgery, Tulane University of Louisiana School of Medicine, New Orleans, Louisiana.

Address: "The Management and Treatment of Scarlet Fever"—Dr. John A. Toomey, associate professor of pediatrics,

Western Reserve University School of Medicine, Cleveland, Ohio.

Address: "Diagnosis of Diseases of the Thyroid Gland"—Dr. Donald Guthrie, associate professor of surgery, University of Pennsylvania Graduate School of Medicine, Sayre, Pennsylvania.

Address: "The Jaundiced Bleeder; Control of Hemorrhage with Special Reference to Vitamin K Therapy"—Dr. Harry P. Smith, professor of pathology, State University of Iowa, Iowa City, Iowa.

SOUTH DAKOTA HEALTH OFFICERS' ASSOCIATION

The South Dakota Health Officers' Association will meet in Huron at the Marvin Hughitt Hotel, October 3, 1939. This is a one day conference only, but an interesting and instructive program is being arranged. This group is really the Public Health Organization of the state, but the name was never available as it previously was used by the South Dakota Christmas Seal and Tuberculosis group. This past year, however, this latter organization adopted the name of South Dakota Tuberculosis Society which now makes available the "South Dakota Public Health Association" for the health officers and public health nurses and workers. A committee has been appointed to study the advisability of the new name and will make its recommendation at the October meeting.

This being the public health group of the state, there is much in common with the State Board of Health and to them most of the morning has been given. Dr. Van Heuvelen, the State Epidemiologist, will discuss the conduct of contagious disease especially in regard to quarantine and follow-up cleaning, now that fumigation is not required. Mr. W. W. Towne, State Sanitary Engineer, is on the morning program as is Dr. J. C. Ohlmacher, Dean of the State Medical School and Director of State Laboratories, to explain the new state set-up of laboratories since the enactment of state laws requiring blood tests for syphilis. In the afternoon a speaker of national prominence is being secured to discuss syphilis control. Dr. W. F. Mengert, associate instructor in obstetrics and gynecology at the University of Iowa, and who in 1936 conducted a state-wide refresher course, will speak on Maternal-Child Welfare, and if time permits there will be papers on an orthopedic subject and on "Contact Infections in Childhood."

The officers of the Association are: President, Will E. Donahoe, M.D., Sioux Falls; vice-president, H. Russel Brown, M.D., Watertown; secretary, J. F. D. Cook, M.D., Superintendent of the State Board of Health, serving out the unexpired term of Dr. B. A. Dyar whose resignation was necessitated by his removal from the state.

REPORT OF THE SOUTH DAKOTA DELEGATE TO THE AMERICAN MEDICAL ASSOCIATION 1939 MEETING*

J. R. Westaby, M.D.
Madison, South Dakota

The American Medical Association held its ninetieth annual session in St. Louis May 15th to 19th, the House of Delegates holding their sessions at the Statler Hotel on Monday, Tuesday, Wednesday and Thursday.

There were 7,412 members of the Association registered out of a total membership of 113,113. Approximately 250 scientific exhibits were housed in the second floor of the auditorium and 240 technical exhibits on the first floor using all available space in the large building not needed for the section meetings which were well attended.

The second award of the distinguished service medal, which, last year was bestowed on Dr. Rudolph Metas, of New Orleans, was bestowed upon Dr. James B. Herrick of Chicago because of his outstanding contributions to the knowledge of coronary thrombosis.

Dr. Irvin Abell laid special stress in his address upon the stand taken by the American Medical Association in its special session at Chicago last September and the recommendations of the delegates to the committee on medical care for the participation of the Federal Government in Health activities. His address might be summarized in a single quotation:

"Expansion of public health, maternal and child welfare services with limitations of curative measures to private practice where available; utilization of vacant beds in present hospitals on a per diem basis; the construction of new beds and diagnostic health centers on a basis of economic, geographic and health needs with standards for hospital administration for professional personnel; perpetuation of hospital and health centers; the formulation of plans for the care of the medically needy, determined by local and state supervision; the approval of sickness compensation and of voluntary insurance for hospitals and medical services, and unqualified opposition to the suggestion that the individual states initiate studies and plans for their people on a tax paid basis."

Regarding the indictment of the American Medical Association, Dr. Abell advocated fighting the issue to the Supreme Court if necessary, so that the Association and the public may know where we stand. The American Medical Association favors:

- (a) The health of the impoverished persons should be protected by the government.
- (b) A department of health should be established with a physician as a cabinet member.
- (c) Public health, maternal and child welfare services should be expanded.
- (d) Better use should be made of the existing hospital facilities and more hospitals should be built only where there is actual necessity for them.
- (e) Although compulsory health insurance is undesirable, hospital and cash indemnity insurance for the payment of doctor bills are all right.

Dr. W. F. Brasch, Rochester, Minnesota, chairman of the Committee to survey the need for medical care, denied in his report that the number of medically needy is anywhere near the 40,000,000 estimated by the various groups of government agencies who claim to have studied the problem. He stated that questionnaires had been sent out to many thousands of doctors and dentists with replies received from 20,199 the analysis of which shows that the figures are more nearly 40,000 than 40,000,000.

The most important business brought before the House of Delegates was that dealing with the Wagner Bill and the National Health Program, pending before Congress. A committee of five was appointed and given ample time to consider every phase of the Bill. At times the capacity of the committee room

*Omitted from the Transactions of the South Dakota State Medical Association meeting, published in the July (1939) Journal-Lancet.

was inadequate to hold the interested representatives of states, hospital groups, dentists, and others who sought to listen or add their advice to the hearing. The committee found that the Bill was incorporating all the proposals of the interdepartmental committee and its technical committee and that there was absence of many of the safeguards to which the House of Delegates had called special attention in 1938. The committee made a most complete report which was adopted by the entire House of Delegates without a dissenting vote and the report will no doubt go down as an epoch-making document, clarifying the principles involved and re-emphasizing the necessity for incorporation, in any proposed legislation, certain essential safeguards to which attention has repeatedly been called.

SUMMARY

1. The Wagner Health Bill does not recognize either the spirit or the text of the resolution adopted by the House of Delegates in September 1938.

2. The House of Delegates cannot approve the methods by which the objectives of the National Health Program are to be obtained.

3. The Wagner Bill does not safeguard in any way the continued existence of the private practitioner who have always brought to the people the benefits of scientific research and treatment.

4. The Wagner Health Bill does not provide for the use of the thousands of vacant beds now available in hundreds of church and community general hospitals.

5. This Bill proposes to make Federal aid for medical care the rule rather than the exception.

6. It does not recognize the need for suitable food, sanitary housing and the improvement of other environmental conditions necessary to the continuous prevention of disease.

7. The Bill does not prescribe methods for determining the nature and extent of the needs for preventive and other medical services for which it proposes allotments of funds.

8. The Bill insidiously promotes the development of a complete system of tax supported medical care.

9. While it provides compensation for loss of wages during illness, it also proposes to provide complete medical service in addition to such compensation.

10. The Wagner Health Bill provides for supreme Federal control; Federal agents are given authority to disapprove plans proposed by the individual states.

11. It is inconsistent with the fundamental principles of medical care established by scientific medical experience and is therefore contrary to the best interests of the American people.

12. The fortunate health conditions which prevail in the United States cannot be disassociated from the prevailing standards and methods of medical practice.

13. No other group or profession have done more for the improvement of the public health, the prevention of disease and the care of the sick than have the medical profession and the American Medical Association.

14. The American Medical Association would fail in its public trust if it neglected to express itself unmistakable and emphatically regarding any threat to the national health and well being. It must, therefore, oppose the Wagner Health Bill.

15. The House of Delegates would urge the development of a mechanism for meeting the needs for expansion of preventive medical services, extension of medical care for the indigent and medically indigent, with local determination of needs and local control of administration, within the philosophy of the American form of government and without damage to the quality of medical service.

16. The fundamental question is how and when a state should be given financial aid by the Federal government out

of the resources of the states as a whole, pooled in the Federal Treasury.

17. The bizarre thinking which evolved the system of Federal subsidies sometimes called "Grants-in-aid" is used to induce states to carry on activities suggested frequently in the first instance by officers and employees of the Federal government.

18. The use of Federal subsidies to accomplish such Federally determined activities has invariably involved Federal control.

19. Any state in actual need for the prevention of disease, the promotion of health and the care of the sick, should be able to obtain such aid in a medical emergency without stimulating every other state to seek and accept similar aid, and thus to have imposed on it the burden of Federal control.

20. The mechanism by which this end is to be accomplished, whether through a Federal agency to which any state in the need of Federal financial assistance can apply, or through a new agency created for this purpose or through responsible existing Federal agencies, must be developed by the Executive and the Congress, who are charged with these duties.

21. Such a method would afford to every state an agency to which it might apply for Federal assistance without involving every other state in the Union or the entire government in the transaction.

22. Such a method would not disturb permanently the American concept of democratic government.

The summary of this Bill has been given in some length with the background upon which the American Medical Association through its House of Delegates bases its positive policies with respect to legislation affecting public health.

The Wagner Health Bill is before Congress in the stage of preliminary hearings before its committees and the individual doctors of the nation should heed the advice of the President-elect of the American Medical Association, Dr. Nathan Van Etten in his acceptance speech to the House of Delegates when he said: "Yesterday you adopted a report defining your position in relation to the proposed Wagner Health Bill. It will be of small value, however, unless the whole medical profession of the United States is educated to understand it. The practitioner is potentially one of the most powerful persons in the democracy. If he can be made to see his duty to his country and educate his patients to a realization of the dangers of centralized control of medical practice, your action of yesterday will be sustained. In the name of welfare, gentlemen, the practice of medicine as you know it and as you hoped it would become is to be destroyed. The functions of the most highly educated group of professionals in the world are to be taken over by bureaus operated by adventurous amateurs. The time has come for the concerted action of every doctor in the United States."

Every county and state medical society should see that a resolution is brought before its business session supporting this action of the House of Delegates of the American Medical Association and copies of these resolutions should be sent to Senators and Representatives of the state in Congress, as well as the chairman of the Senate committee on Education and Labor, Senator Elbert D. Thomas of Utah.

The following officers were chosen for the year 1940. President—Rock Sleyster, M.D., Milwaukee, Wisconsin; president-elect—N. B. Van Etten, M.D., New York City; treasurer—H. L. Kretschmer, M.D., Chicago, Illinois; secretary—Olin West, M.D., Chicago, Illinois; speaker of the house of delegates—H. H. Shoulders, M.D., Nashville, Tennessee; vice-speaker—Roy Fouts, M.D., Omaha, Nebraska.

The next session of the American Medical Association is to be held in New York City June 10th to 14th, 1940.

News Items

Dr. Edmund G. Vinje, a native of Hillsboro, North Dakota, is now practicing in Langdon with Dr. V. A. Mulligan.

Dr. A. F. Branton of Willmar has been appointed executive secretary of the Minnesota Hospital association.

Postgraduate medical short courses to be given by the University of Minnesota at the Center for Continuation Study this fall have been announced. The schedule is as follows: September 25-30—Proctology; September 25-30—Urology; October 9-11—University of Minnesota Clinics; October 16-21—Nursing Education; November 6-11—Cardiology. Dr. William A. O'Brien is director of postgraduate medical education.

Dr. J. K. Kutnewsky who practiced in Redfield, South Dakota for the past 55 years has retired.

Members of the Minnesota-Dakota Orthopedic Club will serve for the fourth year as clinicians at the seven fall clinics conducted by the Bureau of Services for Crippled Children of the State Social Security Board. The schedule announced recently follows: Worthington, September 9; Hibbing, September 16; Marshall, September 23; Winona, September 30; Bemidji, October 7; Fergus Falls, October 28; and Mankato, November 18. Coöperating with the bureau are the Minnesota Public Health Association, Gillette State Hospital for Crippled Children, and the Division of Rehabilitation of the State Department of Education. Children under 21 years of age, who are physically handicapped, and whose parents cannot provide proper medical care, are eligible to attend the clinic. A letter of referral is required from the family physician in charge of the case.

Dr. Gilman H. Goehrs, a graduate of the University of Minnesota Medical school, 1937, is now associated with Drs. Goehrs, Rathbun and Ernst at St. Cloud, Minnesota.

The Honorable Harlan J. Bushfield, Governor of South Dakota, has appointed a Basic Science Board as authorized by the 1939 South Dakota Legislature. The members are as follows: J. D. Alway, M.D., Aberdeen; F. E. Burkholder, D. O., Sioux Falls; M. L. Severence, chiropractor, Aberdeen; Wm. H. Waller, Ph.D., professor of Anatomy, University of South Dakota, Vermillion; Gregg M. Evans, professor of Chemistry and physics, Yankton College, Yankton.

Dr. August C. Orr, Bismarck, director of the division of child hygiene in the North Dakota state health department, has resigned his post to take over directorship of a district health department at Newberry, Michigan. A former resident of Rugby, Dr. Orr came to Bismarck in July, 1936 after practicing for two years at Sarles, North Dakota.

The South Dakota state board of health has announced that licenses to practice have been issued to the following physicians who recently took tests at Rapid City: W. R. Giedt, Vermillion; William V. Walsh, St. Paul, Minn.; Rush William Karrer, Deadwood; Louis G. Roucek, Omaha; John P. Jones, Mitchell; James H. Crawford, Watertown; Leonard A. Veranty, Watertown; Maynard W. Eggers, Sioux Falls; T. J. Billion, Sioux Falls; A. G. Hofferkamp, Sanator, and Leonard DePonceau, Midland. The board also admitted to practice, by reciprocity, Lynn E. Lande of Winner.

The eleventh annual Inactive Status Training Course for Medical Department Reservists of the Army and Navy will be held at the Mayo Foundation, Rochester, Minnesota, October 8 to 22, 1939. The general plan of former years will be followed. Special work in clinics and hospitals will be offered during the morning hours for those asking special assignments. Presentations of carefully selected subjects in military medicine are scheduled for the morning, afternoon, and evening hours. There will be appropriate sections or special courses for officers of the Dental and Veterinary Corps. All Medical Department Reservists are eligible for enrollment. Approved applicants will be enrolled upon the recommendation of the Surgeon of the Seventh Corps Area or the Surgeon of the Ninth Naval District. Applications should be made at an early date and should be forwarded through the respective Reserve headquarters of the officers concerned.

Dr. H. J. Skarshaug formerly of Fargo has opened an office in Washburn, North Dakota.

Dr. Syver Vinje of Hillsboro, North Dakota, recently observed his 25th anniversary of practice in that community.

Dr. David P. Anderson, Jr., of Philadelphia, has joined the Austin Clinic in Austin, Minnesota. A graduate of the University of Pennsylvania Medical school, 1934, Dr. Anderson has spent the past five years at Philadelphia General hospital specializing in surgery.

Dr. John Paul Jones, a graduate of Northwestern University Medical school, 1938, has become associated with Dr. E. W. Jones in Mitchell, South Dakota.

The new \$86,000 municipal hospital at Lake City, Minnesota was opened July 21, 1939.

Dr. Robert W. Merrill, Morris, Minnesota, has purchased the practice of his late associate, Dr. J. F. Cumming of Morris.

Dr. John Arthur Williams, St. Paul, has become associated with his uncle, Dr. L. A. Williams, in the practice of medicine and surgery in Slayton, Minnesota.

Dr. H. E. Hilleboe of Minneapolis has been appointed chief of the medical unit of the social welfare division of the new state department of social security.

Dr. Robert J. Brotchner of Minneapolis has become surgical resident physician at the Northwest clinic and Trinity hospital in Minot, North Dakota.



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Dr. R. R. Hendrickson, St. Cloud, Minnesota, has been named superintendent of Buena Vista sanatorium, Wabasha and Winona county institution. He succeeds Dr. Russell H. Frost who resigned to become head of the Cooley sanatorium at Monroe, Louisiana.

The 24th annual homecoming of Nopeming sanatorium, Duluth, Minnesota, was held August 15. Honored guests included former patients and members of the sanatorium staff. An exhibition of handicraft products of the workshop was one of the program features.

Dr. Raymond B. Allen, dean of the Wayne university college of medicine in Detroit since 1936, has been appointed executive dean of the University of Illinois colleges of medicine, dentistry and pharmacy. Dr. Allen received his Ph.D. in urology from the University of Minnesota in 1934 after he completed his work as a fellow in the Mayo Foundation. After leaving Rochester, he was associate dean in charge of graduate studies, faculty of medicine, Columbia university, and associate director of the New York Postgraduate Medical school, Columbia university.

Dr. R. S. Mitchell of Grand Meadow, Minnesota, was recently honored by that community on the occasion of his completion of thirty-five years of medical practice.

Our attention has been called to the fact that a young man representing himself as a medical student and giving the name of Chester Wainwright, has been soliciting subscriptions from physicians to a publication called *College Years*. He states that the magazine is being sponsored by the Circulation Associates, headed by Walter Camp, son of the famous football coach. He claims he is a graduate of Phillips Academy and of Harvard and that if he receives a number of subscriptions he will be entitled to finish his medical education in any school he selects.

The Phillips Academy, when questioned about the young man, replied that "we do not believe that Chester Wainwright ever attended Phillips Academy. Our records do not contain his name nor do any of us remember him. From time to time inquiries come to us from different parts of the country stating that Mr. Wainwright claims to be a graduate of Phillips Academy. There is no graduate by that name on our books. The inquiries always refer to solicitations for financial assistance. It would seem that the man is an impostor."

The young man, about 20 years of age, is 5 feet, 10 inches tall and is quite thin. He has pointed features, prominent ears. Attired in college dress, polo shirt, etc., he carries a certificate bearing his picture.

ATTENTION SECRETARIES OF DISTRICT SOCIETIES

Space is at your disposal in *The Journal-Lancet* for advance notices and reports of meetings of your society and personal news items concerning members of your society. County and district secretaries are invited to forward such material to *The Journal-Lancet*, 84 S. 10th St., Minneapolis.

Necrology

Dr. John A. Evert, 55, of Glendive, Montana, died August 17, 1939. Dr. Evert was chief surgeon of the Northern Pacific Benefit association hospital.

Dr. John A. Donovan, 67, of Butte, Montana, died July 21, 1939. He had practiced in Butte for 40 years.

Dr. J. M. Allen, 72, of Rosholt, South Dakota, died in Breckenridge, Minnesota, August 8, 1939. He had been a practicing physician for the past 38 years at White Rock and Rosholt, South Dakota.

Dr. Wayne P. O'Brien, chief surgeon at the federal veterans' hospital at Hot Springs, South Dakota, died July 26, 1939. He had been associated with the hospital for the past 11 years.

Dr. F. E. Salvage, 73, of LaMoure, North Dakota, died July 14, 1939.

Dr. Harold Rypins, 49, of Albany, New York, a University of Minnesota graduate and secretary of the New York state board of medical examiners, died recently.

Dr. Theodore Thordarson, 76, practicing physician of Minneota, Minnesota, since 1895, died August 1, 1939.

Dr. K. O. E. Heimark, 66, of Duluth, Minnesota, died July 17, 1939.

Dr. John F. Cumming, 41, of Morris, Minnesota, died July 12, 1939.



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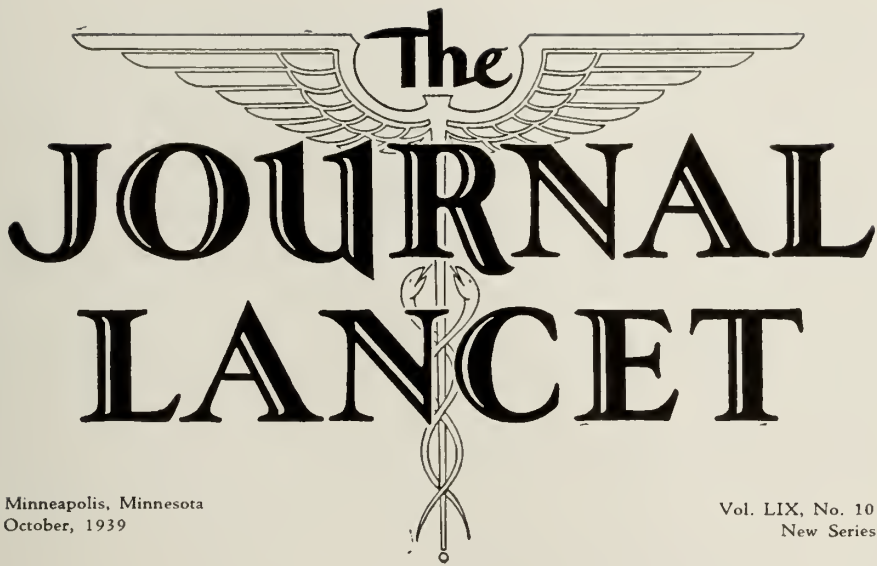
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Maternal Care *An Introduction*

Fred L. Adair, M.D.†
Chicago, Illinois

IT is very gratifying that the JOURNAL-LANCET is devoting an issue to maternal care. It should be very helpful to the readers and be of benefit to their patients because complete maternal care is now recognized by well informed lay and professional groups to be essential for the reduction of maternal, fetal and early infant morbidity and mortality. For about twenty years the American Committee on Maternal Welfare has been urging the medical profession to work both individually and collectively to secure adequate care for all potential and prospective mothers. The Committee believes that adequate maternal care consists of preconceptional, prenatal, intrapartum or delivery, and postpartum care, and of postnatal care for the baby.

Recently this committee has sponsored and produced "The Birth of a Baby" which was designed to be shown publicly with the coöperation of the medical profession of the various states. Its major purpose was to educate mature lay groups relative to the significance and purpose

†Chairman, The American Committee on Maternal Welfare, Inc.

of maternal care and thus help the doctors in securing the coöperation of their patients in giving adequate maternal care. It has been our purpose to stimulate the interest of the doctors in various states and local communities by the formation of committees of the various medical societies. These committees should have a primary interest in the problems surrounding the mothers and their babies. The American Committee has had no set formula for such care but believes that basic principles should be followed though the method of application might vary greatly in different areas. One of the basic principles is education, and this involves both the laity and the profession. These committees should assume leadership in this educational field in their respective areas. They should educate themselves not only to understand the problems of their individual patients but those of their communities. Conclusions should be reached relative to the best solution for the individual and the community.

One very illuminating and valuable method of study is that of case analysis. There have been

facilities and organizations set up in many cities and states for study of fatalities of mothers, of fetuses, and newborn infants. Analyses of these cases have been of great educational value not only in improving the care of individual patients but even more important in pointing out inadequacies for proper care of patients in their homes and in hospitals. There is no reason why these case studies should be limited to fatal cases; good results should be as critically studied as the bad ones for much can be learned from both imperfect and perfect management.

Our committee has always believed that medical leadership is vitally essential for the solution

of all health problems. The viewpoint of the medical profession must not be limited to private practice and to the individual patient. A larger viewpoint must be taken and the welfare and health of the community must be considered as a medical problem. Health depends upon many factors, and it is important for all physicians to realize that the health of individuals is affected by the health status of the community. The status of health and well being in any community depends upon food, shelter, hygiene and good medical and nursing care. The key to and the index of good health in any community is the type of attention and care given to the mothers and babies of that community.

Maternal Mortality in North Dakota

John H. Moore, M.D., F.A.C.S.†

Grand Forks, North Dakota

THIS report on maternal mortality in North Dakota grew out of a request by the Committee on Maternal and Child Welfare of the North Dakota State Medical Association to the North Dakota State Department of Health for an individual survey of all maternal deaths that occurred in North Dakota during 1937 and 1938. Your Committee on Maternal and Child Welfare, through me as its spokesman, gratefully acknowledges the information obtained by Dr. Williams and her staff. The Registrar of the Bureau of Vital Statistics copied death certificates of all cases in which pregnancy or the puerperal state was mentioned and the physicians who signed these certificates were interviewed personally by a physician from the State Department of Health. From these physicians were obtained the case histories of all the maternal deaths recorded.

All physicians were willing to cooperate and expressed approval of the survey as it was being made. Your Committee expresses its thanks to all the physicians of North Dakota for having made this cooperative effort possible.

When the Committee asked me to report to you on the results of this survey, I agreed upon one condition: The report was to remain anonymous insofar as physicians and places were concerned. This stipulation was rigidly adhered to and in the summaries of case histories and other data to be presented as part of this report that anonymity has been scrupulously maintained. In this way we hope to be able to answer the question,

†Chairman, committee on maternal and child welfare, North Dakota State Medical Association.

"Why do women die from child-bearing in North Dakota?" And I know that it is your hope that the answer to that question will suggest some measures by which we, as private practitioners, can still further reduce our already low maternal mortality.

From the official records of a special survey made in 1927-1928, we are able to compare maternal deaths by age groups with the state survey of 1937-1938.

TABLE 1

Maternal Deaths by Age Groups, 1927-1928	
Age	No. Deaths
Under 20	12
20 to 24	32
24 to 29	34
30 to 39	61
40 and over	31
Total	170

TABLE 2

Maternal Deaths by Age Groups, 1937-1938	
Age	No. Deaths
Under 20	2
20 to 24	17
25 to 29	22
30 to 34	19
35 to 39	22
40 and over	8
Total	90

From these two tables it is evident that there has been a sharp reduction in the deaths under the age of 20

from maternal causes and also those dying from similar causes over the age of 40; while in the group 20 to 24 about half as many died in 1937-1938 as in 1927-1928. But in the intermediate age groups one cannot see any appreciable reduction, based on a comparison of the total maternal deaths for these periods. It would seem, other factors being equal, that pregnancy in the very young and in those approaching the end of the reproductive period may have come to be regarded by the laity as more dangerous and that possibly these two age groups sought medical help earlier. If this is so, our problem is to bring the large, middle groups under medical observation earlier in their pregnancies.

The number of the pregnancy in which the patient died is always of interest as here we can make some comparisons over these two ten year periods.

TABLE 3

Deaths by Number of Pregnancy				
Pregnancy	1927	1928	1937	1938
1	22	31	19	15
2	12	8	7	3
3	6	7	5	1
4	7	7	7	1
5	7	6	8	1
6	6	5	3	2
7	4	8	3	1
8	3	4	3	0
9	0	3	2	3
10	4	4	2	0
Over tenth	8	8	2	2

Out of a total of 170 maternal deaths in 1927-1928, 53 or 31 per cent were in primiparous patients; in 90 maternal deaths occurring in 1937-1938, 34 or 37 per cent were in primiparous patients. Either we are not getting the primiparous patient early enough to protect her against the hazards of pregnancy and labor or there are other factors at work which we have not properly evaluated.

The triad, infection, toxemia and hemorrhage, are always listed as the chief causes of maternal deaths and rightly so. In the North Dakota report for 1927-1928, infection killed 32 per cent of the mothers who died; toxemias 27 per cent and hemorrhage 8 per cent of them for a total of 67 per cent of the deaths. In 1937-1938, infection still killed 32 per cent, toxemias 24 per cent and hemorrhage 10 per cent for a total of 66 per cent of the deaths. We can claim a reduction of only 3 per cent in our deaths from toxemia in the comparative percentages for the ten year period. The percentage of deaths from hemorrhage increased by 2 per cent in comparing the two periods.

Since the majority of our maternal deaths in both the 1927-1928 and the 1937-1938 series were classified under this triad, it is important to see if we can trace any factors which may be contributory. In the 1927-1928 series, out of a total of 55 deaths from infection, 23 or 40 per cent of the fatal infections followed abortions; in the 1937-1938 series, out of a total of 29 deaths from infection, 12 of the fatal cases, or again 40 per cent, followed abortion.

In the 1937-1938 series there was a total of 17 deaths from abortion.

TABLE 4

Abortions (including therapeutic)		
Self induced	4	(1 and 3)
Spontaneous	10	(7 and 3)
Therapeutic	3	(0 and 3)

The totals are divided into the respective years, 1937-1938, by the figures in parenthesis following them. The three therapeutic abortions were all performed for hyperemesis gravidarum in 1938. In addition to the twelve deaths from infection following abortion one patient died from influenza-pneumonia and one from secondary anemia. Of the fourteen abortions (not including therapeutic) most of them began at home or in some distant town and were brought to the hospital when in serious condition. There was no definite history of any doctor or mid-wife being in attendance early. The cause, "self-induced" was given only when the patient had admitted it.

There are two very important lessons to be learned just here and if we learn them we can bring about a very substantial reduction in the number of our maternal deaths from infection.

In preparing the following table on prepartum care and maternal deaths, our historian in explaining why only 75 instead of the total of 90 maternal deaths were included stated, "In 1937 six cases were excluded because of death before the fifth month and in 1938 nine cases were excluded because of death before the fifth month." The abortion deaths fall in these excluded groups!

TABLE 5

Prepartum Care and Maternal Deaths.		
Amount of Care	No. of Deaths	Percentage Having Care
Adequate (3 and 2)	5	6.8
Inadequate (18 and 6)	24	32.8
No care (34 and 12)	46	61.3

Litzenberg, in a timely address on the subject, "What is good care for Mother and Babies?"¹ made this statement: "Pre-natal care must begin at once. The idea of having it begin at the third, the fourth, or the fifth month is all wrong. As soon as the woman suspects—even before she knows—that she is pregnant she should consult her physician, and here is the statistical reason: Twenty-five per cent of spontaneous abortions occur before the third month." I recommend this entire address for the careful consideration of all of us but even the limited part of it I have quoted gives us our first important lesson in how to reduce deaths from infection. We must, by every means at our command, succeed in arousing the public to the dangers of abortion and bring the pregnant patient to her physician just as soon as she suspects pregnancy. And it is not the primiparous patient alone, whom we must attempt to reach in order to reduce the death rate from infected abortions. Approximately 80 per cent of these deaths were in multiparous patients with their parity ranging from two to ten and of these, three died in their second and one in her third abortion!

The second lesson we need to learn is one that I have tried to point out before.² In the management of an abortion, in progress or incomplete, there is only one safe rule to follow and that is to *regard all such patients as infected and avoid surgical interference except for the control of hemorrhage!* Conservative treatment should be our sheet-anchor in the management of them. I regard the following as of basic importance in such a plan of treatment:

1. Put the patient at absolute rest in bed.
2. Control pain.
3. Control bleeding by oxytocic drugs if possible; if not, by vaginal tamponade.
4. Combat shock.
5. Have blood examination made.
6. Give supportive treatment when necessary.
 - a. 5 per cent dextrose in saline by phlebotoclysis.
 - b. solution of gum acacia.
 - c. blood transfusion.

Under this plan of treatment, the majority of the patients will complete their abortions spontaneously with a minimum amount of damage to themselves. But, if under such conservative management, evidence of infection increases, the following additional procedures are recommended:

1. Elevate the head of the bed on blocks.
2. Apply ice bags to the lower abdomen.
3. Continue supportive treatment.
4. Employ Elliott treatment.
5. Consider the use of sulfanilamide.
6. Combat anemia with small, frequent blood transfusions.
7. Invade the uterus only for the control of hemorrhage, and then
8. *Do not curette!*

Two brief case histories from our 1937 series will forcefully illustrate the two lessons I mentioned earlier:

Case No. 18. February 20: Had miscarriage of two months at home. Was up and about doing her housework but felt badly. March 20: Entered hospital. Chief complaints were pain, tenderness of lower abdomen, slight vaginal bleeding. Temperature, 102.4 F; pulse 120. Patient acutely ill. March 22: Pelvic examination revealed tenderness, induration, fluctuation and fulness in pelvic cavity. March 26: Death. Autopsy revealed "Much diffuse peritonitis, much pus accumulated in the flanks and in the pelvis. Spleen enlarged to twice its normal size. Plum butter appearance of a toxic spleen. Uterine cavity contained small amount of placental tissue."

Here was a patient who did not give her physician a chance to do anything for her for *one month* after the onset of the illness which was to prove fatal. Surely this patient presents an extreme example of the need for lay education as to the danger of abortion.

Case No. 23. This patient was admitted to the hospital "showing effect of loss of blood and very ill." She had expelled a three months fetus fourteen days previously and the placenta the day before entering the hospital. She had had a great loss of blood but a curettage was done in the hospital on the day she entered and upon admission her hemoglobin had been recorded as 45 per cent and her erythrocytes as 2,610,000. Two weeks later she was discharged from the hospital although the blood picture remained the same. Five days after leaving the hospital she was brought back. Her hemoglobin was 40 per

cent, erythrocytes 2,880,000 and leucocytes 15,000. She died nine hours after her second admission.

This patient, likewise, had had no prepartum care but surely, during her two weeks in the hospital, there must have been time for an intensive campaign of conservative, supportive therapy!

Seventeen cases of puerperal infection remain to be classified in our deaths from infection in the 1937-1938 series. As to prepartum care, they revealed the following:

TABLE 6

Prepartum Care	
Prepartum care:	
Adequate	0
Inadequate	3 (3 and 0)
No care	14 (10 and 4)
Developed in hospital	8 (7 and 1)
Developed in home	9 (6 and 3)

It is encouraging to note, even in this small series, that the numbers in parenthesis to the right indicate an improvement in 1938 over 1937. It is also noteworthy that in not one of the deaths from puerperal sepsis during this two year period had any of the seventeen patients had adequate prepartum care.

Unfortunately, we have not enough data to analyze the nine deaths from sepsis following deliveries in the home but for the eight deaths from sepsis which followed hospital deliveries we find the following: Two patients had normal deliveries. Three of the remaining six had high forceps deliveries, two had versions and extractions, one died from an infected episiotomy wound although the delivery had been spontaneous and one patient died following a curettage done by a visiting physician on the twentieth day postpartum. Her delivery had been normal. The three deaths from sepsis following high forceps operation all occurred in 1937.

Case 19. Death certificate: Puerperal sepsis. Terminal: peritonitis. Prepartum care: Last four months. The Doctor stated that her condition seemed good. No records were available to our historian. Labor was long and hard, due to a moderately contracted pelvis and a large baby. High forceps were used. The mother's temperature rose on the third day after delivery and the patient ran a septic course until the seventh postoperative day and death.

Case 35. Death certificate: Exhaustion, postpartum hemorrhage and septicemia. "Brought to me after four days in labor." Face presentation. Prepartum care: None. I quote from the second physician's record, given to our historian by him: "Prolapse of cord four days. High forceps. Stillborn. Dead for unknown length of time. Macerated. Vulva and perineum greatly swollen. Temperature 103 F, pulse 136 on admission. Temperature 104 F, pulse 144 on second day. Temperature 105 F, pulse 160 on fourth and last day. Hemorrhage scanty in hospital but apparently marked previously. Forceps had been previously applied."

Case 19 evidently represents a cephalo-pelvic disproportion which was overlooked in a primiparous patient. That there had been time to determine this is evidenced by the fact that she had had prepartum care for the last four months.

Case No. 35 illustrates the "dangerous multipara" in one of her most dangerous moods, a neglected face presentation! This case originated in the home and terminated in the hospital. It is one of the reasons why

hospital mortalities in obstetrics are likely to run higher than an equal number of deliveries in the home. The hospital so often gets the complicated cases! Had the first physician who treated this patient recognized the pathology present early enough, the second physician would probably not have had to sign a death certificate for a patient with puerperal sepsis. High forceps operation, whether it be performed on the primiparous or the multiparous patient, is one of the most difficult and dangerous operations in the entire field of obstetrics, difficult from a mechanical standpoint and dangerous from the ever-present dangers of trauma with the resultant hemorrhage and sepsis.

Case No. 52 represents the third death from sepsis following high forceps operation. The hospital in which this death occurred had no records except the nurse's daily report! Here is a case where there was not the slightest evidence presented to warrant the performance of one of the most dangerous operations in obstetrics—high forceps. The reflection is on the hospital as well as on the physician. Here is an institution, admitting maternity patients and without any record system except the nurses' daily reports. It is to be hoped that such haphazard methods will be speedily corrected in the interest of patients, physicians and hospital!

In leaving this analysis of the hospital deaths from sepsis, only two of the eight deaths followed strictly normal labors. Both of these normal labors had intercurrent infections at the time of delivery. That leaves six deaths that followed operative procedures varying from episiotomy to high forceps operations, an operative incidence in the hospital cases of 75 per cent. We do not know the incidence of operative procedures in the nine cases where sepsis developed in the home, except in the occasional instance, but we do know the hospitalization record for the entire group of 90 deaths which occurred in 1937-1938. These are given in the next table and, again, the figures to the right in parenthesis give, respectively, the "break-down" for 1937 and 1938.

TABLE 7

Hospitalization for Entire Group	
	Cases
Hospitalized before complications set in	20 (14 and 6)
Hospitalized after complications set in	51 (31 and 20)
Not hospitalized	19 (16 and 3)

It would appear from this table that approximately the same number of our fatal cases for this two year period were not hospitalized at all as compared with the number of patients who were hospitalized before complications arose. That leaves the large, middle group of 51 patients or 56 per cent of our total deaths who, for the most part, presented greatly increased obstetric risks when they entered our hospitals.

My impression, gained from a study of these 51 patients and the circumstances under which they died is that the need is for:

1. More adequately staffed and supervised maternity departments.

2. More consultations among the physicians doing obstetrics, especially in the matter of deciding upon the wisdom of a proposed obstetric operation.
3. More adequate equipment to meet the obstetric emergency.
4. More careful and complete records of the maternity patient.

In the two year period, 1937-1938, there were twenty-two deaths from the toxemias of late pregnancy in North Dakota. This group comprises 24 per cent of our total deaths and is second in the triad. It is 3 per cent less than in 1927-1928. Several tables will illustrate what happened in this group:

TABLE 8—Prepartum Care

Patients with Toxemia of Late Pregnancy.	
Adequate	2 (1 and 1)
Inadequate	9 (4 and 5)
None	11 (8 and 3)
Total	22

TABLE 9

Delivery	
Normal	6 (5 and 1)
Operative	13 (6 and 7)
None	3 (2 and 1)
Total	22

TABLE 10

Births	
Live births	14 (9 and 5)
Stillbirths	6 (4 and 2)—twins
No birth	3 (2 and 1)
Total	23

TABLE 11

Operative Deliveries in Fatal Toxemias	
Cesarean section	2 (1 and 1)
Forceps deliveries	9 (4 and 5)
Not stated	2
Total	13

The first of the deaths from toxemia following cesarean section revealed the following:

Case No. 4. Prepartum care: Given by a doctor during the last three months. This patient entered the hospital with no record of any complaints. She was not in labor. Measurements were recorded as "no disproportion." Urinalysis and blood pressure normal. Cesarean section was performed on the day of admittance to the hospital. No reason for it was recorded. The patient died on the twenty-first postoperative day.

One would find great difficulty in justifying cesarean section in this patient. To me it represents an operative furor, wholly unjustified, and with the doctor's own record to condemn such a radical procedure.

Case No. 27. Prepartum care: None. The patient developed edema, headache and epigastric pain at the seventh month of pregnancy. She was admitted to the hospital with a blood pressure of 236/110. Albumin 4 plus. No convulsions. Glucose solution was given intravenously. Three days later convulsions began and induction of labor was done. The following day she was delivered of a stillbirth by cesarean section and died during the operation.

An eclamptic patient is in shock or on the borderline of it. To subject such a patient to the risk of a major

surgical procedure is neither good obstetrics nor good surgery. Probably this patient would be classified as a nephritic type of toxemia with hypertension. She was a desperate risk to begin with but the pregnancy was only at the seventh month and a medical induction of labor had been done. Why add the final shock of a cesarean section?

Another type of dangerous operative interference is illustrated by the following case history:

Case No. 5. Patient admitted to the hospital at 6:20 P. M. She had had regular prepartum care and her condition was apparently good. She walked in complaining of sleeplessness. Temperature, pulse and respiration normal. Blood pressure not recorded. The following day she had a severe headache and aspirin was given. At 11:30 P. M. she had her first convulsion. She was given calcium gluconate, bromides, caffeine sodiobenzoate and chloroform. The next morning at 2:00 A. M., Pituitrin M.5 was given and the membranes were ruptured artificially. Magnesium sulphate 25 per cent and glucose 50 per cent were given intravenously at 4:00 A. M. There was slight dilatation of the cervix. Pituitrin M.10 was given. Convulsions occurred every few minutes.

Bimanual dilatation of the cervix was done and a stillborn infant delivered by high forceps operation at 8:45 A. M. The placenta was normal. First degree lacerations were repaired.

The temperature was recorded as 98 on the day of admission. No further record of it was found until three days later at 10:30 P. M. when it was 102.4. It remained above 100 until three days later when it was 104. It continued between 103.2 and 105 until death. There was no written order, no temperature chart, no laboratory report and no blood pressure reading on the hospital chart.

Here is an example of "accouchement force" applied to a toxic patient with the all-too-frequent fatal result. Other histories could be cited to throw grave doubt on the wisdom of forceful interference in patients suffering from the severe toxemias of late pregnancy; but it is only necessary to point out what a previous chart has shown; that in the 22 patients who died of toxemia, 13 or over 50 per cent, had some type of operative delivery whereas six or only 27 per cent died following normal delivery.

As I have pointed out, we have reduced our deaths from the toxemias of late pregnancy 3 per cent in ten years. If there is to be any further reduction in deaths from this type of obstetric complication, it will come through an earlier recognition of them and a more conservative management. Prevention means prepartum care early, regularly and faithfully, and it means a campaign by organized medicine through the individual physician to get the women of our state familiar with the criteria of adequate prepartum care.

As to active treatment, I cannot refrain quoting from Mengert.³ Speaking of a patient presenting toxemia with convulsions, he stated to us in his course last year: "However, to deliver such a patient immediately is inviting disaster, because she is in no condition for any type of strenuous therapy. Delivery of the eclamptic woman before full dilatation of the cervix represents radicalism. In a series of more than five thousand eclamptics, the maternal mortality rate of patients treated by radical means varied between 20 and 25 per cent. In a similar series of five thousand eclamptics treated conservatively, the maternal mortality rate was only 10 to 12 per cent. In other words, to deliver the eclamptic by whatever means before full dilatation of the cervix

doubles her chances of dying. Holland (British Isles), in a review of treatment of eclampsia in England, found that manual dilatation (or laceration) of the cervix as a treatment for eclampsia gave the highest maternal mortality rate. Cesarean section was the next worst method of treating the eclamptic."

Summing up the treatment of the severely toxic or convulsive patient, my own experience has taught me that the best results are to be obtained by:

1. Employing conservative methods of treatment. We prefer a modified Stroganoff treatment without the chloroform but with adequate sedation. While this is being carried out, hypertonic dextrose solutions are given by phlebotomy and the fluid intake and the urine output are carefully checked for adequacy.
2. When the maximum improvement has been attained we prefer to induce labor, if necessary, by mechanical rupture of the membranes.
3. When the cervix has fully dilated, we deliver by midplane or low forceps if the head is well down in the pelvis. High forceps are not used. In the event that the head is at the inlet or above, version is our operation of choice.

Ten per cent of our maternal deaths for 1937-1938 are directly charged to hemorrhage, the third member of the fatal triad. Three of the nine deaths from hemorrhage were due to placenta previa; the remaining deaths, five in 1937 and only one in 1938, occurred from the period immediately after labor to as long as 27 days following delivery.

Two of the deaths from placenta previa are interesting and instructive:

Case No. 1. Prepartum care: None. On December 26, 1936, the patient was carried into the hospital and a doctor was called. Her husband stated that the patient had a hemorrhage the first week in December and continued to have some bleeding until December 26, when she had a sudden severe hemorrhage which sent her to the hospital.

The patient was examined and attended by a physician through December 26, 27, 28, 29, 30, 31. She continued to bleed. Pulse 104 to 112. She was given calcium lactate, lextron and morphine.

On January 1, 1937, labor began at 3:30 A. M. Pituitrin ½ cc. was given at intervals for six doses. The membranes were ruptured artificially at 6:30 P. M. and the baby was stillborn at 6:58 P. M. The placenta was expelled at 7:15 P. M. and death occurred at 8:50 P. M.

This is a typical history of a neglected case of placenta previa. For a period of weeks this patient bled daily at home and bleeding continued for six days after she was admitted to the hospital. There is no record of blood counts or hemoglobin determinations, no record of any direct attempt having been made to stop the bleeding and no record of blood transfusion or any other supportive intravenous fluids having been given.

Case No. 37. Prepartum care: None. When at term, this patient had a severe hemorrhage at home. There is no history of the hemorrhage having been associated with pain. She was taken 20 miles to the hospital, delivered spontaneously and died two hours later.

If this was a case of placenta previa, it, fortunately, represents the unusual type. It is rare for the first hemorrhage in placenta previa to be as severe as this one.

The 20 mile trip to the hospital was doubtless a debilitating factor. One wonders if there was time for intravenous fluids to have been employed; certainly it would tax the facilities of the hospital to have had blood donors available on such short notice.

In all of the deaths from hemorrhage one fact stands out: No attempt was apparent in any case to supply the fluid lost!

We all recognize obstetric hemorrhages as dramatic events which are likely to occur when we are least ready to combat them. But there is no longer any need for us to remain totally unprepared for such emergencies. Flasks of 5 per cent dextrose in normal saline, normal saline solution and 6 per cent solutions of gum acacia are now so readily available, sterilized and portable, that every hospital admitting maternity patients should be required to have them instantly available. From personal experience, I can recall several cases of obstetric hemorrhage that have been tided over the critical period until a suitable blood donor was available by the use of a 6 per cent solution of gum acacia by phlebotomy. Nor does the administration of any of these solutions need to remain a hospital procedure. An intravenous outfit with tubing and needles properly sterilized and the solutions in sterile flasks as prepared by the manufacturers are now so readily available and so portable that they ought to be part of the regular armamentarium of every physician practicing obstetrics in home or hospital. Particularly is the need for them likely to arise in the case of the physician attending an obstetric patient far from a hospital. He can, if so equipped, meet the dramatic emergency of a sudden hemorrhage at the patient's bedside, in her own home, without waiting for distant help which, if it arrives at all, most often arrives too late.

In the list of maternal deaths for 1937-1938 there are thirty, or one-third of the total number, classified under miscellaneous headings.

Under "Accidents of childbirth," our historian has classified ten cases—two in 1937 and eight in 1938.

One case history will illustrate one type of patient we may all see at any time and in whose presence, even with modern therapy, we are so often helpless.

Case No. 3. Prepartum care: Eight months. The patient had a normal pregnancy until one week before delivery when she became ill with influenza and entered the hospital. Twenty-four hours before delivery she developed lobar pneumonia, was typed and serum was given. Labor began normally and lasted one hour. Quick, easy birth was by breech presentation. The patient was cyanotic and was not removed from her room for delivery. Death occurred twenty-four hours after delivery.

This patient and five others in whom pneumonia complicated pregnancy at various stages of gestation illustrate what has so often been said about the dangers of respiratory infections complicating pregnancy.

Two deaths following cesarean section are also included in this group. In one case death was due to post-operative shock and cardio-respiratory failure in a primiparous patient with post-infantile paralysis of the accessory muscles of respiration. Her pelvis was so badly deformed that measurements were impossible. The second death following cesarean section occurred in a multiparous patient who was sectioned approximately one

week after induction of labor had been attempted by various means, including artificial rupture of the membranes. The wound became infected three days after the operation and approximately ten days later the patient suddenly died.

A patient with a typical case of decompensated mitral stenosis died undelivered and the complication in the final case in this list of "Accidents of childbirth" was proven by autopsy to be "a gangrenous section, measuring about 20 inches, of large intestine." This was dilated and suggested a previous megacolon. Delivery had been accomplished elsewhere and the patient was admitted to the hospital in extremis.

Under the heading "Other toxemias" are listed seven deaths, three of pregnancy or puerperal psychosis and four cases of hyperemesis gravidarum. They died at various stages of pregnancy or the puerperium.

A review of the four case histories of the patients dying from hyperemesis gravidarum reveals an identical sequence of events in three:

1. A background of nervous instability.
2. A thorough trial of the commonly accepted treatment for the vomiting of pregnancy including diet, sedation, hypodermoclysis, phlebotomy and, in two instances, blood transfusions.
3. Therapeutic abortion in three cases, 15 to 30 days after treatment was first instituted.
4. All three died from 21 to 23 days after therapeutic abortion with terminal hyperpyrexia.

The fourth case and the only multiparous patient in the series (para 8) vomited from early pregnancy until her death at the fifth month. She had prepartum care including one month hospital treatment from the beginning of the fourth month and she died undelivered.

This is not the place for a discussion of the management of cases of hyperemesis gravidarum but it is pertinent to add this thought: Every patient suffering from the so-called "normal" nausea and vomiting of pregnancy is a potential candidate for hyperemesis gravidarum. While there is no doubt but what there is a large neurotic background in the vast majority of these patients, it is a grave mistake to dismiss them with that explanation. In spite of our best therapy, a certain percentage of these patients will develop symptoms of a toxic nature, chiefly polyneuritic, and it requires a nice discrimination to know when a therapeutic abortion should be performed.

In the deaths from psychosis, all were multiparous patients: All had insomnia as the chief prodromal symptom. Two of them died one month and one week, respectively, following labor; the third during the fourth month of pregnancy. In the two cases that died following delivery there had been no prepartum care. The patient who died in the fourth month of pregnancy started as a case of toxic vomiting but during the six weeks of her hospitalization she developed a violent mania. When a pregnant patient begins to complain of insomnia, it is time to investigate her carefully from a mental standpoint if we have not done so earlier and, in the puerperium, I have noted that insomnia is the

cardinal symptom noted in patients who subsequently develop insanity.

Seven patients are classified under the heading "Embolism and sudden death." A review of the histories substantiates such a diagnosis in each case. Four of them followed normal deliveries. One occurred a few minutes after an unattended delivery and two followed abortions. I know of no way in which we can predict such a dramatic accident.

The last group comprises six deaths from ruptured ectopic pregnancies. Two of them died unattended but the diagnosis was established by the aspiration of blood from the abdominal cavities and in the other four it was confirmed by laparotomy or autopsy. I fail to find any instances where one of them could have been saved by any means available to the attending physicians. However, these deaths teach us the importance of careful history taking. In this connection I would especially call your attention to the splendid article by Schoregge⁴ in the February 1939 issue of the JOURNAL-LANCET in which he reviews 166 cases of ectopic pregnancy treated in the Quain and Ramstad Clinic. Here is practical advice that will prove helpful in meeting this major disaster of early pregnancy.

One of the most striking things noted in going over the statistical data on our maternal deaths was the apparent relationship between maternal mortality and the degree of prepartum care. Fully 94 per cent of the women who died in this two year period had inadequate prepartum care or none at all.

Your Committee on Maternal and Child Welfare in January, 1938, endorsed the principles of antepartum, intrapartum and postpartum care as contained in the booklet, *Maternal Care*, edited by Dr. Fred L. Adair. We recommended to the North Dakota State Department of Health that this booklet be distributed as far as funds would permit to physicians practicing obstetrics in North Dakota. This has been done.

Birth rates are always of vital concern. The next chart shows the birth rate per 1000 population from 1930 to 1938, inclusive. You will note that over this nine year period it has declined 3.31 per thousand. In the nine year period, 1930 to 1938, inclusive, our stillbirth rate per 100 live births has fallen 0.7 of one per cent and most of this small drop has occurred in the past three years.

TABLE 12—Births
(Rates per 1,000 Population)

Year	Births	Rate
1930	14,639	21.50
1931	14,232	20.79
1932	13,858	20.15
1933	13,324	19.28
1934	14,613	21.04
1935	13,819	19.80
1936	13,770	19.67
1937	13,005	18.43
1938	12,880	18.19*

*Provisional.

TABLE 13—Stillbirths
(Rates per 100 Live Births)

Year	Stillbirth	Rate
1930	407	2.8
1931	409	2.9
1932	390	2.8
1933	341	2.6
1934	352	2.4
1935	352	2.5
1936	370	2.6
1937	308	2.4
1938	274	2.1*

*Provisional.

In any study of maternal mortality, the infant mortality rate is of vital economic importance. With a falling birth rate, a rate in our own state which is dangerously near that necessary to maintain a stable population, the chief answer to the falling birth rate, from a medical standpoint is better maternal care through all stages, pregnancy, labor and the puerperium.

I am gratified at being able to show you this next chart for it shows the maternal death rate for North Dakota per 1000 live births from 1930 to 1938, inclusive. I am sure that we all feel proud of the rate of 2.25 for 1938, by far the lowest on record. The problem of maintaining this low rate or even of lowering it still further is our problem as private practitioners.

TABLE 14—Maternal Deaths
(Rates per 1,000 Live Births)

Year	Deaths	Rate
1930	90	6.14
1931	69	4.82
1932	71	5.12
1933	68	5.10
1934	70	4.79
1935	71	5.21
1936	60	4.36
1937	61	4.69
1938	29	2.25*

*Provisional.

I believe that the private physician in North Dakota is assuming the leadership in maternal care that is rightfully his and the response that the physicians of this state have given our Committee on Maternal and Child Welfare in its attempts to further your educational program is most heartening.

If I could leave any one thought with you to the exclusion of all others it would be this: 61 per cent of the maternal deaths in North Dakota during 1937-1938, exclusive of the deaths from abortion, occurred in women who had no prepartum care; 66 per cent of the maternal deaths for the same period, including abortions, were due to the triad, infections, toxemias and hemorrhage. We have sufficient knowledge to prevent the majority of these deaths. But to prevent them we must get the patient early enough to apply that knowledge. In this fact alone lies our greatest challenge—and our greatest opportunity.

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Postgraduate Education in North Dakota

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AS in many other states, postgraduate medical education in North Dakota has been largely confined to obstetrics and pediatrics. This is not because physicians are especially deficient in these branches of medicine but because there is now an especially great interest in the welfare of the mother and the infant. That is as it should be if we are to continue to lower the maternal and infant death rates.

Component district societies, of course, provide programs with outstanding speakers for their respective groups and frequently these deal with obstetrics and pediatric subjects. However, this discussion has to do only with organized effort to supply the medical profession of the whole state. All of these endeavors have been carried out by the Committee on Maternal and Child Welfare of the North Dakota State Medical Association in cooperation with the State Department of Health. The chairman of this committee, Dr. John H. Moore of Grand Forks, and the State Health Officer, Dr. Maysil Williams of Bismarck, have been and are very interested in doing everything which lies within their power to provide the most complete information and facilities for the doctors of the state in order that the profession may have no obstacles to the rendering of the best possible service to the people of the state. Both of these doctors have upon various occasions stated that they believe that North Dakota is blessed with a very high type of medical practitioner.

The first attempt at postgraduate medical education was made in 1936 when Dr. John Urner of Minneapolis was brought to the state by the committee and the State Department of Health. He lectured at five towns in the state and was worked very hard, giving a talk in the afternoon, in the evening and again the next forenoon. These meetings were very well received by the doctors of the state. Especially did they appreciate the willingness of Dr. Urner to talk with them after the formal meeting about their particular problems. This is an especially important feature of postgraduate courses and time should always be provided for it. In this way the men have an opportunity to discuss cases which have given them some concern with a man who they feel can give them sound advice.

Nothing more was done with postgraduate courses until at a meeting of the committee held in Bismarck January 29, 1938, Dr. Ralph Pray of Fargo was appointed chairman and the writer the other member of a subcommittee to arrange for a postgraduate course in the fall of 1938. Dr. William F. Mengert of the University of Iowa and Dr. Willis H. Thompson of the University of Minnesota were brought to the state for two weeks, the former to lecture on obstetric subjects and the latter on pediatrics. Meetings were held at Bis-

marck on October 17 and 24, at Dickinson on October 18 and 25, at Minot on October 19 and 26, at Grand Forks on October 20 and 27, and at Fargo on October 21 and 28. At each place the lecture on obstetrics was held at four o'clock and that on pediatrics at 8 o'clock. The meetings were held at these points because the subcommittee felt that these towns, because of location and size, were best suited to supply opportunity for the largest number of physicians to attend the courses with the fewest miles travelled. The time of the meetings was so selected because it was believed that it would require the least time away from the physician's office. Two hundred and sixty physicians attended the courses and that number is more than half of all the doctors in the state. We believe that that is a good attendance. After the meetings were over, Dr. August C. Orr of the State Health Department sent questionnaires to all those who had registered to find out whether or not the kind of course which had been given was appealing to those who came. With one exception all who replied—and more than half returned the questionnaires—were enthusiastic in their comments regarding the courses as held last fall. Many came long distances to attend—one physician came more than 160 miles.

Information regarding the courses was made available to the doctors through the press and by a circular letter sent out by the State Department of Health about one month before the first meeting. A little later a letter containing a return postcard for advance registration was sent to each physician in the state. After the courses were over, the booklet "Maternal Care" approved by the American Committee on Maternal Care and edited by Dr. Fred L. Adair of the Chicago Lying-In Hospital was sent to the physicians of the state following the recommendation and endorsement of the State Committee on Maternal and Child Welfare. It is the belief of the committee that the profession of the state was interested and satisfied by these courses as conducted in the past year. The committee hopes and believes that it will be able to arrange a series as acceptable for the fall of 1939. By the time this is in print each physician will have received information about the places and dates of this year's meetings.

The Committee, through its chairman, Dr. Moore, was able with the cooperation of the State Health Department to inaugurate a program designed to lower the mortality of the premature infant. Through the efforts of the committee, incubators of good quality have been installed in more than twenty hospitals of the state. Another phase of the program was the sending of Dr. Ralph Pray of Fargo to many of the cities and towns of the state to discuss the problem of the care of the premature with the laity, the nurses and the physicians. In

most of the localities three meetings were held, one for each of the three groups mentioned. While no registration of the laity attending was made, the number at each meeting was good. A total of 594 nurses attended lectures held for them. Each component medical society held a meeting at which Dr. Pray was the principal speaker for that occasion.

In May 1939 funds were made available by Dr. Williams of the State Department of Health for the purpose of sending ten physicians to attend the course in obstetrics held at The Center for Continuation Study at the University of Minnesota. The registration fee, traveling and living expenses were paid from these funds. When they returned, they were enthusiastic about the course which they had just attended. North Dakota may take some pride in the fact that more physicians have registered from this state for the medical courses at the Center for Continuation Study than from any other state including Minnesota.

The manner of selecting ten men was left to the district societies—one from each district. That the physicians were anxious to have the opportunity is evidenced by the fact that each district had from eight to ten applicants. The successful one was drawn by lot from the list.

In the fall of 1939, Dr. Russell J. Moe of Duluth will be the lecturer in obstetrics and Dr. A. V. Stoesser of Minneapolis will present pediatric subjects. It is hoped that towns and dates may be selected so that even more than attended last year will be able to register this year.

All funds for the expenses for the above courses have been made available by Dr. Williams of the State Health Department from funds which she has on hand. No registration fee has ever been charged those attending the meetings although there may come a time when this will be necessary.

The Toxemias of Late Pregnancy*

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ALTHOUGH recent years have shown a definite decrease in maternal mortality due in part at least to a steady decline in the number of deaths from toxemia, this condition still constitutes one of the major causes of maternal mortality. Furthermore, as recently pointed out by Miller¹ immediate mortality does not tell the whole story since many women show a remote morbidity and mortality as a result of toxemia during pregnancy. Peckham² also reports that prolonged follow-up study of toxemic patients demonstrates that one-third of them will be left with chronic vascular disease. The fact that our knowledge of the etiology of toxemias has not changed materially in recent years does not seem to make improvement in the control of the condition impossible, as evidenced by recent progress. The improvement seems to be in the use of various empirical methods for control of symptoms and when these fail, interruption of the pregnancy early enough to avoid serious permanent damage.

Since all of the toxemias of late pregnancy have certain characteristics in common, namely edema, hypertension and albuminuria, and since their exact differential diagnosis is dependent in many cases upon elaborate

investigation and follow-up it seems that for practical purposes of prophylaxis and treatment they can be grouped into three main groups: (1) Essential hypertension, or chronic hypertensive vascular disease, (2) Acute and chronic nephritis, (3) Pre-eclampsia and eclampsia.

ESSENTIAL HYPERTENSION

Patients who present evidence of mild chronic hypertensive vascular disease before or early in pregnancy without evidence of impaired renal function frequently show an exacerbation of the condition as pregnancy advances. This may occur at any stage of pregnancy but frequently takes place in the later months.

The usual picture is that of a mild elevation in blood pressure with a systolic reading from 130 to 160 mm. and diastolic of 90 to 120 mm. As a rule, in the early stages, the patient has no complaints and there is usually an absence of edema and albuminuria. As the pregnancy advances there is likely to be an increase in the hypertension which may reach over 200 mm. systolic with a proportionate rise in diastolic pressure. As the disease progresses, we may see mild albuminuria also but rarely is it a remarkable feature. Edema likewise is usually absent even in advanced stages. This condition differs from the pre-eclamptic and nephritic group in

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that water retention and proteinuria are absent or minimal. These patients may go on to full term and deliver without serious complications but many of them have a premature delivery following fetal death which results from extensive placental infarctions. As a rule the blood pressure reduces somewhat following delivery but rarely does it return to normal or to the level that it was before pregnancy.

NEPHRITIS

Strictly speaking nephritis complicating pregnancy should not be considered as a toxemia but since the signs and symptoms resemble so closely those of toxemia and because the differential diagnosis is so difficult and frequently impossible, it is generally considered as such. Nephritis complicating pregnancy may be either of the acute or chronic type.

Acute nephritis fortunately occurs rarely during pregnancy. It presents the same findings as in the non-pregnant state with hypertension, hematuria, casts, nitrogen retention, etc., and might simulate marked nephrosis. It should be considered as a grave complication requiring in most instances termination of the pregnancy as soon as the diagnosis is made. The differential diagnosis from the other toxemias is based on the urine and blood findings and its sudden onset, with postabortal or postpartum clearing of the process.

Chronic nephritis complicating pregnancy is often insidious in its onset. The patient, more often than not, will give no history of previous renal difficulty and all examinations at the onset of pregnancy may be normal. As a rule this condition tends to make its appearance earlier in pregnancy than does pre-eclampsia. The most common complaint is headache which tends to be dull and general rather than acute and frontal as in the true toxemia. Lassitude and general malaise are often present and in the severe cases visual disturbances and changes in the ocular fundi appear. Hypertension is uniformly present but its degree varies greatly. The systolic pressures range from 140 to well over 200 mm. with corresponding diastolic pressures. Repeated checks will show the pressure fairly constant with the general trend upward. Albuminuria usually occurs in varying degrees and casts may be present. Renal function tests (concentration and urea clearance) frequently show evidence of impairment of function. In advanced cases oliguria may occur. Edema which may be marked is usually present. Blood chemistry more frequently gives evidence of nitrogenous retention than in eclampsia.

ECLAMPSIA

Pre-eclampsia and eclampsia represent only different stages of the same disease. As was previously stated the exact etiology of the disease is unknown. Recent investigations by Newburgh³ and Strauss⁴ strongly suggest that it is the result of undue water retention. The exact change which causes this is not apparent but experimental evidence suggests that the retention may be conditioned hypoproteinemia and excess sodium. Certain physico-chemical changes in the relationship between the

blood plasma, the interstitial fluid and the intracellular fluid resulting in the symptoms of toxemia were recently presented by McPhail⁵ which help to rationalize the prevention and management of toxemias.

Edema is usually the first sign to make its appearance and this is best determined in its early stages by careful check of the weight at frequent intervals. Hypertension subsequently makes its appearance but as a rule is less marked than in nephritis. Albuminuria also appears later than in nephritis and is generally less marked as are other evidences of renal damage. The reason for this, recently pointed out by Herrick⁷ et al is that the role of the kidney is probably incidental rather than fundamental and that it participates because it is such an important part of the circulation. Visual symptoms may appear but the ocular fundi rarely show more than arteriolar spasm in the early stages. Nausea and vomiting are not uncommon. Cerebral disturbances as shown by mental or motor irritability, appear in the advanced state and finally convulsions occur.

PROPHYLAXIS AND TREATMENT

One of the most important considerations in the prevention of toxemias is very careful investigation of the patient at the time of first examination. This should include a complete physical examination, careful check of blood pressure, complete urine, blood counts and serology. If any evidence of abnormality in the cardiovascular or renal systems exists, further investigation is immediately indicated.

If the patient is normal in all respects, it is then advisable to give instructions in regard to dietary needs, danger symptoms and prenatal follow-up. In general we feel that women during pregnancy should have a well balanced diet. Since there is evidence that hypoproteinemia may influence water balance we feel that a minimum of 50 Gms. of protein should be taken daily. The other substance which is known to be related to water balance is sodium. We advise against excess amounts of sodium in any form.

The patient should be seen at least once a month for the first six months and the weight, blood pressure and urine checked at each visit. During the seventh and eighth months visits should be every two weeks and during the last month once a week. The reason for greater frequency in the last trimester is that during this period we see the greatest instance of toxemias. In addition to the items mentioned the patient should be questioned in regard to headaches, edema, return of nausea and vomiting, etc. The check of the weight is essential because this is the best criterion of the development of invisible water retention or occult edema which occurs before pitting edema can be observed. The average weight gain of the pregnant woman should not exceed 20 to 25 pounds. A persistent weight gain of more than 1.5 pounds per week can almost invariably be regarded as evidence of water retention.

As soon as any variation from the normal makes its appearance, the patient should be regarded with suspicion and more thoroughly investigated.

Essential Hypertension: When a patient with known hypertension becomes pregnant or when hypertension appears in the absence of other findings, the patient should be carefully watched for further elevation. She should have as limited physical activity as is compatible with her mode of living and should have mild sedation. She should have plenty of fluids and a light diet with limited sodium chloride and average intake of protein. Limitation of activity and mild sedation with phenobarbitol ($\frac{1}{2}$ grain three or four times daily) are most important in the prophylaxis. Any decision regarding the termination of the pregnancy must be made after careful evaluation of all factors. Since all available information indicates that the majority of these patients will have an increase in hypertension due to the pregnancy and that some will go on to develop so-called malignant hypertension, it would seem just to consider termination of pregnancy when a progression of the disease is noted in order to prevent later difficulty.

Nephritis: There is little to be said about the prophylaxis of acute nephritis since it is an incidental complication of pregnancy. Obviously the maintenance of good general health and the avoidance of acute infections are essential. When the condition makes its appearance, the patient usually becomes rapidly worse and if the diagnosis can be definitely made, immediate interruption should be considered. The remainder of the treatment should be that of acute nephritis.

Chronic nephritis, in general, should also be considered as an indication for termination of the pregnancy. Unfortunately, as has been said, the differential diagnosis between a mild nephritis and pre-eclampsia is frequently extremely difficult. Several items may assist in the differentiation. The majority of true toxemias appear in the last four to six weeks of pregnancy and it is extremely rare to see one before the seventh month so that albuminuria and hypertension, etc., appearing in the first two trimesters with rare exceptions are of nephritic origin.

Repeated renal function tests may help. If the urea clearance is constantly lowered and if the concentration test shows impairment we may suspect nephritis. Study of the ocular fundi offers a valuable aid in differentiation. In toxemias, spasm of the retinal arterioles, retinal edema and occasionally detachment of the retina or fresh hemorrhage are seen, while in nephritis arteriosclerotic changes, exudate and hemorrhage are apt to be present.

If the differential diagnosis can be made, it is generally agreed that because of the almost certain further injury to the kidney and because of the distinct increase in the tendency for spontaneous termination of the pregnancy due to placental infarctions that termination should be advised. If after full explanation of the situation, the patient chooses to continue with the pregnancy or if the exact diagnosis cannot be made, treatment the same as that to be described for toxemias should be instituted.

Eclampsia: In pre-eclampsia with the first appearance of symptoms and signs the patient should have definite

FIGURE I.

An Acid Ash:	A Neutral Ash:	A Basic Ash:
Meat	Butter	Milk
Fish	Cooking fats	Cheese
Eggs	Salad oils	Vegetables
Cereals and their products	Sugar	Fruits (with the exceptions under "acid").
Breakfast cereals	Tapioca	Beans (lima, kidney).
Bread	Vinegar	Almonds
Rice	Gelatine	Chestnuts.
Macaroni	Cornstarch	
Spaghetti	Tea	
Hominy	Coffee	
Corn		
Lentils		
Peanuts		
Walnuts		
Prunes		
Plums		
Cranberries		

} Containing benzoic acid which is conjugated with glycine and excreted as hipuric acid.

This diet is characterized by a low Na content and a neutral or acid ash. The food is prepared and served without salt. Bread made without salt and sweet butter are used. Care must be taken not to use foods preserved with salt (ham, bacon, pickles, olives). Only cottage cheese and fresh water fish are allowed.

FIGURE II.

Suggested Arrangements of Foods.

Meat or fish—1 large serving.	
Eggs—3 (or 1 egg and 1 serving of meat or fish).	
Bread—4 slices.	
Cereal—1 serving (any cooked cereal. Puffed wheat, or rice, Quaker shredded wheat.)	
Rice, macaroni or spaghetti—1 serving.	
Milk—4 glasses.	
Fruit—2 servings.	(See
Vegetables.	List)
Butter—6 pats.	

This list will meet the nutritional requirements of the pregnant woman and at the same time will yield a neutral ash. This combination will furnish almost 85 gms. of protein and 2100 calories. Additional calories can be obtained from more bread, salad oil, sugar and candy, desserts using cereals. If fewer calories are desired use skimmed milk, less butter and fruits canned without sugar.

limitation of activity. In view of the evidence that water retention plays an important role in the condition, measures to combat this are instituted. Since sodium is an important factor the patient should have a diet low in sodium. An additional feature of dietary management which will aid in liberating stored fluid and sodium, as pointed out by Gamble and Newburgh, is the use of diet which will yield a neutral or slightly acid ash. Figure I and II. If further acidification is desired to aid in this elimination, the addition of ammonium chloride in doses of 8 to 15 grams daily for three or four days can be given. This salt is used to release the sodium ions from the tissues. After absorption from the gastrointestinal tract it is broken down in the liver to form urea and chloride ions. The latter conjugate with the sodium from sodium acid carbonate NaH_2CO_3 and the sodium is excreted as sodium chloride. With prolonged use of ammonium chloride the kidney has a tendency to reconvert the urea to ammonium ions and excrete it as ammonium chloride leaving the sodium in the body. Hence it should not be used for more than three or four days. It should be given in gelatin capsules, in order to avoid gastric irritation and vomiting. In order to maintain nitrogen balance and to prevent a lowering of serum proteins a diet containing about 85 grams of protein is used. If the patient is losing large

amounts of protein in the urine, this is of particular importance.

Fluids should be forced. A urinary output of 2500 cc. will be ample unless great renal impairment exists. The importance of abundant fluids has been emphasized by Newburgh. He points out that the water loss by evaporation from the lungs, through the skin and in the stool, which ordinarily amounts to 1200 to 1500 cc., is supplied first and the remainder of the fluid taken is available to the kidney for excretion of urinary solids. Under normal conditions it requires about 12 cc. of water to excrete 1 gram of urinary solids but if the kidney is damaged, much more may be needed. Therefore, it is desirable to maintain the fluid intake above 3000 cc. daily.

If the symptoms are mild, the above regime can be carried out at home with success. If the condition is more severe the same treatment is used but the patient is observed more closely and hospitalization with bed rest is desirable. Under this treatment the majority of patients will improve and the condition may clear up entirely. If, however, the patient becomes worse and eclampsia seems likely, termination of the pregnancy, by the most conservative means for that particular patient, is advised. With close observation and adequate treatment, however, the incidence of true eclampsia should be materially reduced.

In eclampsia the convulsions may be controlled by various means. Morphine may be used but it does depress the respiratory center quite severely. Intramuscular injection of phenobarbitol sodium is fairly efficient. In our hands the use of Avertin in a dose of 50 to 70 mg. per kilo. of body weight has proved very effective. Fluids must be given parenterally. The dehydration therapy of Arnold and Fay has been used successfully by the originators but we favor the use of abundant fluids in order to supply the kidney with enough water to excrete all of the urinary solids and prevent tissue damage. There is disagreement in regard to the use of isotonic or hypertonic fluids. In general we give 50 to 100 cc. of 50 per cent glucose imme-

diately to reduce intracranial pressure until adequate sedation can be accomplished. This is followed by continuous 5 per cent or 10 per cent glucose intravenously, given at the rate of 200 to 400 cc. per hour. The heart must be watched for evidence of cardiac failure, dilatation of the right side, which will result in pulmonary edema. If this should occur the fluid should be stopped temporarily until the heart is able to function properly.

Unless very severe kidney damage has occurred diuresis will usually be noted in 8 to 10 hours on this treatment and the patient will usually improve markedly. When the general condition is improved, further treatment of the pregnancy is considered. If beyond the period of viability induction of labor is usually considered advisable. If before this period, some favor carrying the patient further along but most obstetricians interrupt because of the danger of serious damage to the patient if allowed to continue. The method of termination of pregnancy will vary depending on the conditions in each patient but in general conservative measures should be employed. Cesarean section as a rule is not considered a desirable procedure in eclampsia.

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Child and Maternal Health Program in South Dakota

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RECENTLY, the State Board of Health, through its division of Child and Maternal Health, appointed an advisory committee to aid this department in, as the name implies, an advisory manner. This committee is composed of three physicians, practicing in the extreme east, west and central portions of the state. One member is a pediatrician, one a general practitioner with a large obstetrical practice and one is a general practitioner, whose background includes work in public health. While this committee has not yet met to organize and recommend policies, it is felt that through such a committee, and the coöperation of the state medical personnel, more can be accomplished to further child and maternal health.

The set-up of the work of the health department will be much the same as in the past. The coöperation of the practitioners of the state has been splendid and we feel that with the help of the new committee in an advisory capacity, it will be possible to gain the coöperation of the public. This is essential, and much effort is now being directed at gaining this coöperation by the division of Child and Maternal Health of our State Board of Health. Certain, it is, that no amount of knowledge on the part of the physician can help in prenatal care if the patient will not come to him before confinement. Literature distributed to the expectant mother by the State Health Department is an example of the methods now employed to gain their coöperation. Part of this literature is in the form of a monthly prenatal letter. These letters are sent to the mothers through the request of their physician or—in the counties where county nurses are employed—at the request of such nurse. Each letter is made up of information bearing on the prenatal period and an explanation of the importance of consulting the physician who will manage the confinement, or some other physician if it is impractical to see her confining physician.

The general outline of the work being carried on by the state department is as follows:

1. Prenatal Care.
 - A. Literature distributed.
 - B. Conferences.
 - C. Classes.
 - D. Home Visits.
2. Aiming at Better Care at Delivery.
3. Postpartum Care.
 - A. Literature.
 - B. Classes in Child Hygiene, etc.
 - C. Conferences.
 - D. Home Visits.
4. Pre-School Care.
 - A. Conferences.
 - B. Immunization Clinics.

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- C. Distribution of Biologicals.
 - D. Literature.
 - E. Limited Distribution of Codliver Oil.
 - F. Home Visits.
5. School Age.
 - A. Conference, Medical & Dental.
 - B. Immunization Clinics.
 - C. Literature.

Prenatal Service, through the medium of letters as mentioned above, to the mother. These letters are requested by the physician on cards supplied him through the State Board, to be filled in as follows:

Reported by..... County.....
 Name (patient)..... Address.....
 Expected date of confinement.....

Other publications sent with the prenatal letters are:

- Letter I—The Expectant Mother.
- Letter II—Food Guide.
- Letter III—What Builds Babies.
- Letter IV—Why Drink Milk.
- Letter V—Why Sleep.
- Letter VI—Keeping the Well Baby Well.
- Letter VII—Prenatal Care.
- Letter VIII—Why Register.
- Letter IX—Infant Care.

It would be of interest and benefit to go into the contents of these letters but space will not permit. The prenatal conferences are prenatal clinics, where this can be arranged. But, for the most part they are conferences with expectant mothers by public health nurses for the purpose of advising the patient and acquainting her with the necessity of medical prenatal care, encouraging her to seek care and advice at regular intervals. Classes are held in counties where public health nurses are employed. (There are 25 such counties in this state.)

Aiming at Better Care at Delivery: This has in the past been accomplished through the establishment of clinics for physicians in a few of the larger centers of the state. The clinics have been conducted by obstetricians from schools of neighboring states and have been very helpful.

Postpartum Care: Here again literature distributed to the expectant mother has been of great value. This literature has done much to aid the physician to put the care and feeding on a scientific basis and to wean the mother from superstitious rights, which have been in the past and still are to a great extent such a hazard in the infant's first year of life. Further, in those counties where nurses are retained, classes are conducted, as well as postpartum calls made in many instances, if the physician desires it. Child hygiene and home nursing are taught.

Conferences or clinics are held, where it is possible to do so. At these the baby is examined, and defects are noted, particularly those defects which are amenable to correction and which have a bearing on the infant's future health. To my mind, this is the only type of clinic that is worth the time spent on it. I am opposed to the baby shows, where baby is examined and given a prize for the most perfect physique. The normal is made up of averages, and one baby within limits may be normal for its body and still not be average. I once saw one of these clinics conducted when the thermometer was over 100 in the shade. All the babies had a heat rash and all lost points because of it. I know of one babe whose ear lobes did not please the examiner, the parent being told that the lobes should be like those of the examiner. I mention these instances only to show how ridiculous the infant clinic can be made.

Our efforts should be directed at finding defects that can be corrected and advising the parent of the possibilities of correction, and the dangers of neglecting correction. These clinics are conducted by practicing physicians in the area. Often the State Fair is utilized as a time to conduct such clinics, when many are there and when the services of competent physicians can be obtained. Without criticizing this practice, I wonder if we should encourage parents to bring these infants to so large a gathering, when it is often so hot, knowing that the rest of the day baby will, in all likelihood, be lugged about the fair grounds in the dust and heat.

Pre-school Care consists of conferences or clinics. These children are examined much the same as the postpartum child with the idea of finding all defects which can, and should be, corrected. Here attention should be given to the possibility of tuberculosis. There is much controversy as to the value of the tuberculin test. A positive Mantoux calls for an X-ray, which should be interpreted by one who is competent to do so. The physicians of South Dakota may, if there is any doubt in their minds as to the interpretation, send their films to the state sanatorium for examination and diagnosis. The positive Mantoux that is not followed by X-ray loses most of its value.

The Immunization Clinic for Pre-School Children: There is some difference of opinion as to the advisability of giving the immunization for scarlet fever. Many of our leading men do so routinely, while others employ it only at the request of the parent. There is no controversy, however, over the use of diphtheria immunization (or if there is, it is only in the method and dose to employ). This is offered at all our pre-school immunization clinics, as is vaccination for smallpox. If these have been given the year before, the parent is advised to have the Schick test and a second vaccination as a test. As has been mentioned, the tuberculin test is here offered. The state furnishes the biologicals for these clinics. Scarlet fever serum is not available from the state.

Pre-school health is also furthered by the distribution of literature. Following are some of the topics treated:

(1) Communicable Disease, (2) Communicable Disease Control, (3) An Excellent Communicable Disease Chart, (4) Tuberculosis; and seven other pamphlets on these subjects. Others for the care of the pre-school child are: (1) Child from One to Six, (2) Child Management, (3) Food Guide. There has been a limited distribution of cod liver oil to those who are in need, and whose daily diet was not considered adequate. Some of this has been to the expectant mother as well. It is certain that in these times many of the conditions noted in the daily round of the general practitioner are the direct result of malnutrition, and while cod liver oil will not furnish all that is lacking, it has helped to fill some of the gaps.

School Age: Immunization clinics in this group are simple, and many can be served in a day if adequate nursing and clerical help are available. The immunizations are the same offered in the pre-school clinics. Here again the Mantoux is offered and advised, with the idea here, as well, that positive tests should be followed by X-ray. Medical and dental clinics, or conferences, are arranged, where possible, for the finding of defects which are amenable to correction, and which are detrimental to the future health. Defects which are not detrimental, but are only causematic, will probably be asked about and, if so, advice will be given; but to advise such correction when not asked, is not the wisest practice for reasons that are apparent.

Literature can be given to the child, after he has reached the reading stage, as well as to the parent. Much material of this kind is now available, graduated to the capability of the student. Literature is also distributed to the teacher, as it is felt that there is much that the teacher should know and much that the teacher can accomplish with this knowledge. A pamphlet is now being put into the hands of every teacher, "What Every Teacher Should Know About the Physical Condition of Her Pupils."

The above briefly is a resume of the program of the State Health Department in behalf of Child and Maternal Health, with a few comments by the writer, which have nothing to do with the program. Particularly should we be interested in any effort to bring down an altogether too high infant mortality rate, and reduce the maternal death rate. In the past few years, the profession has been made conscious of the necessity of bettering these conditions, and I believe as a whole, the profession has made a great effort to practice better obstetrics. We shall have to go farther, we must educate the public, the expectant mother—yes, grandparents and other relatives—to the necessity of prenatal care, best conditions for confinement, and postpartum care.

It has also been suggested that frequently the physician, after delivery, gives all the attention to the mother, sometimes even at the expense of the infant. Surely, we should all realize that this is a critical period for the new life, and much can happen quickly. This is the time when we should watch the infant.

Prophylaxis of Puerperal Sepsis

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CONSTANT discussion of the subject of puerperal sepsis is necessary if we are to hope for the ultimate eradication of this dread disease. Knowledge of the cause and prevention of puerperal sepsis is constantly being broadened by exhaustive study. Although maternal mortality due to infection has decreased from 10 per cent of patients who entered maternity hospitals, prior to the advent of our knowledge concerning the nature of infections, to 0.22 per cent at the present time, the mortality rate from this cause is still too high.

A majority of fatal cases arise from exogenous sources. The attending physician may be responsible for introducing the offending organisms in a large percentage of these cases. The Public Health Relations Committee of the New York Academy of Medicine, after an exhaustive study of maternal deaths, concluded that 75.1 per cent were preventable. The physician was considered responsible for 81.7 per cent, of which 65.5 per cent were errors in technique, and 34.5 per cent errors in judgment. A more significant study is the one recently reported by Peckham, covering 447 maternal deaths occurring in the strictly rural areas of Maryland, during the years 1930 to 1936. It is interesting to note that 89.6 per cent were attended by physicians. Still more interesting is the fact that 60 per cent terminated as normal deliveries. Sepsis accounted for 34.18 per cent of the deaths. The national maternal mortality rate, from this cause, during that period, was 37.75 per cent. On analysis of Peckham's figures it is found that 34.61 per cent of whites died of infection, 21.1 per cent following infected abortion, and 13 per cent from true puerperal sepsis.

Williams, Watson, Colebrooke and others have proven 60 per cent to 70 per cent of puerperal sepsis to be due to the beta-hemolytic streptococcus, either alone or in mixed infection. It is asserted by Douglas that more than half of maternal deaths due to puerperal sepsis are due to this organism. Watson and co-workers at Sloane Hospital, found the great majority of these infections to be of exogenous origin. Endogenous bacteria account for many instances of low grade infection and thrombophlebitis. It is the exogenous infection against which we must wage our never ending battle. DeLee has shown air-borne infection to be a hazard; however, the real source of danger lies in introducing bacteria directly into the birth canal. This puts the burden of responsibility upon the shoulders of the medical profession.

With the advent of the antiseptic and aseptic era, there was a phenomenal drop in the maternal death rate due to infection. However, as the dread of this ever present danger has been removed, men have become more daring in operative procedures. As a result,

although death rates from other obstetrical complications have decreased, deaths from infection have not. In 1929, Adair and Tiber made the gloomy observation that "there has been no noticeable improvement in maternal deaths during the past 15 years." Tandy, in 1935, was more cheerful in pointing out that maternal mortality in this country had decreased each year between 1925 and 1933. During that eight year period, maternal deaths, due to infection, only dropped from 24.3 to 22.1 per 10,000 live births.

Plass feels the high incident of puerperal sepsis is due to "operative furor" born of a false sense of security arising out of improved surgical and obstetrical technic. Is it that we lack due respect for the virulence of the common organisms because of the many antiseptics available? Or is it because of obstetrical fearlessness among unqualified men? Much of it is due to the appallingly high incidence of criminal abortion.

Realizing that preventive treatment of puerperal sepsis is vastly more important than curative treatment, let us review and discuss those points known to all of us, but all too frequently forgotten or neglected, which may aid in the reduction of the mortality and morbidity from this cause. This will be most expeditiously done by discussing it under the following headings: (1) general measures; (2) measures used during the antenatal period; (3) measures used during labor and in the puerperium; (4) a brief mention of treatment in light of preventing spread of a relatively mild or localized infection.

GENERAL MEASURES

Under the heading of general measures must be discussed briefly home vs. hospital deliveries. Advocates of hospital delivery point out the incontrovertible facts that: Major obstetrical complications many times can not be prognosticated nor properly dealt with in the home; that unsatisfactory home conditions are as important indications for hospital delivery as the major obstetrical complications; that major operative procedures are too frequently attempted in unfavorable environment; and, the reason hospital statistics often do not compare favorably with home delivery statistics is due to the fact that many cases, unfavorably affecting the former, are started in the home but end up in the hospital. DeLee believes that the danger of exogenous infection in the general hospital, operating maternity units, is greater than in well conducted home deliveries. He points out that women become relatively immune to the bacteria with which they are in daily contact, while they possess no immunity to those organisms often present in general hospitals. These contentions are supported by the records of the Outpatient Service of the Queen Charlotte Hospital, London, and of the Chicago Maternity Center. The former had 4,165 deliveries without

a single maternal death, while the latter had only one death in over 9,000 deliveries. One cannot help wondering how many cases these outpatient home services sent to hospitals thus favorably affecting their own statistics.

There are many other points to be mentioned under general measures of prophylaxis against puerperal infection. It seems that one of the most important of these is to dispel the erroneous belief that modern antiseptics will protect our patients against exogenous infection. Unfortunately many breaks in technic arise because of this belief. We are prone to slight scrubbing our hands feeling that the alcohol and lysol, or whatever antiseptic we use, will "get" the bacteria we fail to remove. Vaginal examinations are more readily and repeatedly performed with the serene belief that the antiseptics will kill the "bugs". Under this false sense of security, we are often tempted to indulge in radical interference with less hesitation.

General hospitals conducting maternity services should have completely isolated units with separate nursing and housekeeping staffs and no departmental interchange of help or interns. Individual kitchens, pantries and laundries are desirable. Even the entrance to such units should be separate from the main building, if this is possible. Williams did not share the belief of DeLee that general hospitals should not conduct maternity services, providing there is proper isolation of the unit. It is desirable that each pregnant or puerperal patient be exposed to as few contacts as possible, in order to reduce the danger of carrier infection.

Education of the laity to seek premarital, prepregnancy and early prenatal examination and advice is doing much to reduce maternal complications. The importance of this cannot be over emphasized. Many venereal infections are eradicated in this fashion. Cervical infections can be treated before pregnancy occurs; foci elsewhere may be eliminated and the general resistance of prospective mothers improved by proper supportive and corrective measures. General dissemination of contraceptive advice and material has been offered as one remedy to the ever increasing incidence of infected criminal abortion.

ANTENATAL MEASURES

Our greatest service to maternity patients probably comes during labor and delivery. On the other hand we can do much during the antenatal period to obviate complications late in pregnancy. Proper prenatal care will bring our patient to the crucial time of delivery in the best possible condition. In our efforts to prevent puerperal infection, measures designed to build up resistance should be the essence of antenatal care. Complete physical examination and history may reveal latent disease requiring special handling. Complete blood studies will often uncover an unsuspected low grade anemia the correction of which may mean the difference between success or failure in preventing or treating a puerperal sepsis. Instruction in the essentials of diet, particularly in respect to vitamins and minerals and

undue weight gain, is an important factor in building adequate resistance. Supplementary vitamins and minerals, especially vitamin D with calcium and iron may be indicated. It is most important in preventing infection to educate patients in the proper hygiene of pregnancy. They should be warned against the dangers of introducing infection into the vagina by self examination, coitus, especially after the seventh month, and the taking of unnecessary douches. Vaginal infection should be eliminated by active treatment as early in pregnancy as possible. Routine douching or instillations as prophylactic measures in normal cases are not necessary. It should be recognized and patients taught that generally speaking they are relatively immune to their own bacteria, and that the normal vagina has a mechanism of prophylaxis which is quite efficient if it is not interfered with.

Workers at Sloane Hospital have reported recovery of hemolytic streptococci from 3.4 per cent of all cases admitted to that institution and although patients from whom they were recovered have a higher incidence of puerperal morbidity than non-carriers, still only 12.2 per cent of them have febrile puerperal courses. On the other hand, manipulation and obstetrical operations definitely increase the incidence of morbidity in this group beyond that of similar maneuvers in the non-carriers. On this basis it is wise to reduce the number of vaginal examinations, performed during the antenatal period, to a minimum. Vaccination and immunization against the common offending organisms has been suggested, but where tried in fairly well controlled groups has met with little if any success.

MEASURES DURING LABOR AND THE PUERPERIUM

It is during labor that we must exercise our greatest care in preventing the access of infecting organisms to the birth canal. In hospitals it is desirable to isolate all unknown cases presenting themselves for obstetrical care the first time, during labor. Likewise is it desirable for attending men to handle patients, with whom they have had no previous contact, as potentially contaminated. All patients should receive routine preparation, including shower bath, if time permits, not just clipping of the vulval hair, but careful shaving followed by meticulous scrubbing with soap and water. The lower bowel should be emptied by means of tap water or soap suds enemas. The vulva and area immediately surrounding it may or may not be sprayed with some non-irritating antiseptic. Colebrooke feels that there is no particular choice of antiseptics and that probably soap and water would do just as well. Stressing antiseptics undoubtedly detracts from other more important aspects of aseptic technic.

Masking of all attendants has been stressed by many, notably Watson and his co-workers at Sloane Hospital. They emphasize the necessity of covering completely both nose and mouth. During the epidemic of puerperal sepsis occurring in 1927 they found the source of infection to be the nose and throat of nurses, interns and attending men. It is now routine in most maternity hos-

pitals to periodically culture the upper respiratory tract of all obstetrical attendants and to remove from duty all strept-carriers. It is obviously impossible to carry out such elaborate technic in many instances, but it would seem even more desirable in general hospitals caring for obstetrical patients. It goes almost without saying that no one with coryza should be admitted to the labor or delivery room. Patients with acute upper respiratory infections should be masked. Those who have wide experience in the care of puerperal sepsis feel that it is most desirable for everyone to mask completely whenever the vulva and perineum is exposed even for routine rectal examinations. Titus reports the reduction of the incidence of maternal infection in his institution from 19.9 per cent to 8.92 per cent by the simple expedients of masking and the vaginal instillation of antiseptics.

The matter of routine periodic vaginal instillation of antiseptics is a controversial point. As mentioned, Titus is a strong advocate of this maneuver, advising either 4 per cent mercurochrome or 1:5,000 aqueous merthiolate. On the other hand Mengert feels that they are of little or no value. Colebrooke writes, "It is inadvisable to attempt to improve upon nature's arrangements for keeping the genital tract free from pathogenic bacteria. Our efforts should be directed toward conserving the resistance of the patients, rather than toward dubious attempts to annihilate bacteria."

It hardly seems necessary to caution against too frequent examination during labor, yet in institutions training nurses or interns this is a real hazard. The incidence of sepsis is in direct proportion to the frequency of examination. Particularly is this true of vaginal examinations. Most authorities agree that one vaginal examination done under the strictest of surgical technic is comparatively innocuous but as routine they are decidedly contra-indicated. Even rectal examinations may prove dangerous. Pushing the mucosa roughly into the cervix or against the presenting part may light up a latent cervical infection. Whenever it becomes necessary during the second stage to perform a vaginal examination, the vulva and introitus should be flushed thoroughly or wiped with sponges soaked in an antiseptic or green soap solution. The labia are then separated with one hand and the examining finger introduced without touching the surrounding tissues.

Long labors necessitate the exercise of increasing vigilance against infection. Exhaustion, dehydration and trauma are probably more important as predisposing causes of sepsis than operative procedures performed to terminate these labors. Organisms to which a patient has relative immunity may become distinctly pathologic with trauma and lowered resistance. Naturally, operative deliveries predispose to infection by the possible introduction of exogenous organisms. The incidence of sepsis increases proportionately with the length of labor and the severity of the operation performed. We are all guilty at some time or other of performing major operative procedures on patients in only fair or poor condition without defensible indications. We may be accused of that compulsive urge to "do something." Generally

speaking, however, those who have published the best results have an unusually low incidence of operative or "active" interference.

One other important phase of intrapartum prophylaxis is the conduct of the third stage. A too hasty or vigorous attempt to express the placenta may lead to severe hemorrhage with subsequent anemia and lowered resistance. Control of bleeding from lacerations or partial placental separation should be immediate. Repair of laceration must be carefully done with the best aseptic technique. In this regard it is doubtful if routine inspection of the cervix is indicated. About 4 per cent of cervixes are lacerated to a sufficient degree to necessitate repair. Williams felt, and his opinion is concurred in by many today, that inspection of the cervix in the absence of active unexplained bleeding, is meddling interference which leads only to an increased incidence of puerperal infection.

Deep and prolonged anesthesia, especially with ether, is prone to produce atony of the uterus with consequent postpartum hemorrhage. All of us will admit the usefulness of analgesics and anesthetics in preventing undue fatigue, and in conservation of a patient's resistance, while on the other hand, recognizing the dangers involved in their promiscuous use. Of no little importance in regard to the use of analgesics in early labor is the danger of infection arising out of the universal tendency for patients to clutch at the vulva and to thresh around thus rubbing infection into the vagina. In considering the safety rather than the comfort of our patients, it is better to have no medication rather than those used injudiciously.

Prophylaxis of infection during the puerperium is primarily a matter of nursing care. Routine four hour temperature charts should be kept on all patients. Those patients who have been unknown quantities prior to the onset of labor should be placed in observation wards until they have been found to be free of infection. Where routine culturing of the vaginal flora is performed, all carriers of the hemolytic streptococci are isolated. Any patient with elevation of temperature subsequent to the first twenty-four hours postpartum should also be isolated. Mothers having infected babies should not have any direct or indirect contact with those with normal infants. The converse of this is true. The ideal, as far as nurseries are concerned, is to have three, one for normal infants with normal mothers, one for normal infants with infected mothers and one for infected infants. Of course, where this is impossible, the infected or potentially contaminated infant should receive individual care.

Proper nursing care calls for definite routine. Each nurse should have sufficient time in order not to be rushed to the extent that she may slight the prescribed technic for care of normal patients. Carriers should be eliminated and all attendants should be required to mask both mouth and nose for perineal care. The same should be required of anyone inspecting the perineum. The hands and arms should be scrubbed for a minimum of two minutes with soap and running water before

touching the vulva. It is ideal to have individual equipment for each patient, but where this is not possible each item should be sterilized before being used. The patient must be emphatically instructed under no circumstances to adjust her perineal pad, or to touch the vulva. Most units make use of pitcher perineal douches, of sterile water or mild antiseptic solutions at periodic intervals and following each micturition or defecation. Episiotomies or perineal repairs, of moderate degree, usually require no special attention.

MEASURES DESIGNED TO PREVENT SPREAD OF INFECTION

Once a true infection has developed much can be done prophylactically to prevent its spread. A patient is usually considered to have a puerperal sepsis when the temperature is elevated to 100.5 F. on two successive days exclusive of the first twenty-four hours postpartum. Such a patient should be isolated and treated with "intelligent neglect." Treatment of puerperal sepsis is comparable to treatment of infected abortion. The average case of postpartum infection becomes manifest by the third or fourth day and where there is a fatal outcome it classically occurs on the tenth day. Where evidence of infection does not develop until late, i. e., eight to twelve days, the offending organism is most likely to be the gonococcus. The essence of treatment is conservatism. Active or radical treatment usually arises from that previously mentioned compulsion to "do something." Advocates of this type of treatment seem to forget that the greater number of causative agents spread by hemolysis and direct invasion. Few, except the gonococcus, spread by extension along the mucosa. Instrumentation can not hope to reach organisms deep in the uterine wall or lymph channels and only serves to stir it up. Nature has provided a protective mechanism in the uterus which, if left alone, will often localize infection to the endometrial cavity. Advocates of active treatment fail to realize that infection in the uterus can not be compared with a surface infection. The only indication for invasion of the uterus in these cases is uncontrollable hemorrhage. Both Williams and DeLee favor conservatism, feeling that it is "less dangerous to leave a uterus full of infected ovular remnants to the powers of nature."

Conservative treatment, briefly, consists of bed rest with elevation of the head of the bed to promote drainage. The uterus should be in fair contraction, even if it is necessary to administer ergot. Keep in mind that toxic cases have a reduced resistance to ergot, hence periods of rest in its administration should be observed

in order to prevent ergotism. The bowels should be kept as quiet as possible with a liquid or semi-solid diet and opiates if necessary. Control of pain should be with caution for fear of covering signs and symptoms of spread. Fluids are important, and incidentally, nourishment may be administered intravenously in the form of glucose. Infrequent examination is advisable relying on the clinical course to follow the progress of the infection. Repeated small (200 to 250 cc.) whole blood transfusions have proven of the greatest value in treating this disease. Sulfanilamide has been used with good results by some men. However, a caution should be given against its indiscriminate use in infections of unknown origin. Culture of the lochia, uncontaminated, directly from the uterus with identification of the streptococci by cultural methods has been advised before sulfanilamide is used. Administration of thyroid as a circulatory stimulant has been advised in order to prevent venous stasis and thrombophlebitis. Local heat in the form of douches, Elliott therapy, or diathermy should be postponed until some degree of localization has been effected. Drainage of large collections of pus, when sufficiently localized, is done preferably by colpotomy, but may be done from above if it is walled off from the general peritoneal cavity. Antistreptococcus serum and immuno-transfusions are still experimental and are best left to the large clinics for the present. After allowing a reasonable length of time for localization to occur, evacuation of the bowel may be effected by mineral oil, stupes and rectal tube, Harris tidal proctoclysis or low tap water enemas.

An effort has been made to review those points of importance in the prophylaxis of puerperal sepsis which we all know, yet concerning which we need constant reminding. Prophylaxis is vastly more important than curative treatment. There are no shortcuts to proper treatment of this disease. "Only an organized effort on the part of all, an insistence on uniformity of methods, a loyalty of purpose and, finally, a repetition of details that becomes ritualistic and automatic in performance will bring the desired results." Exercise of the greatest judgment, avoiding harmful intervention and uncalled-for radicalism while realizing that the outcome of puerperal infection is largely dependent upon the patient's own powers of resistance will lead eventually to the reduction of this maternal complication to the irreducible minimum. The compulsion to "do something" should be checked by the realization that nature often corrects seemingly impossible difficulties if just given time. It has been said that the greatest virtue of an obstetrician is patience.

Maternal and Infant Mortality in Montana

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IN recent years many studies have been reported on maternal and child health. Public interest has been aroused. Some articles appearing in the lay press have been erroneous due to misinformation, failure to consider all aspects of the problems or through incorrect interpretation of facts. Since 1922 there has been a steady reduction in both the maternal and infant mortality rates in Montana.

Every maternal death has been investigated by the Committee on Maternal and Child Health of the Montana State Medical Association since 1937. It is known that some women have lost their lives as a result of inadequate care during pregnancy, labor or puerperium. The responsibility for this unnecessary loss of life must be assumed either by the community, the family, the individual, the physician or the attendant at the time of delivery. Before any definite conclusions are drawn regarding problems of maternal care in Montana, and before conclusions can be drawn regarding factors to be considered if the maternal mortality rate is to be brought to the irreducible minimum, a study of all births must be made. It is unfair to judge the maternal care situation solely from maternal deaths. Data must be made available to indicate the kind of care given mothers throughout the period of pregnancy, the facilities available for care in Montana, and the social, economic and educational factors which influence the type of care received as well as the availability of optimal medical and nursing care.

The following statistical data is presented through the cooperation of the Maternal and Child Health Division of the Montana State Board of Health and the Committee on Maternal and Child Health which serves as an advisory committee to that Division.

Montana entered the birth registration area in 1922. The maternal mortality rate has dropped from nearly 80 per 10,000 live births in 1922 to 37 in 1937 with a

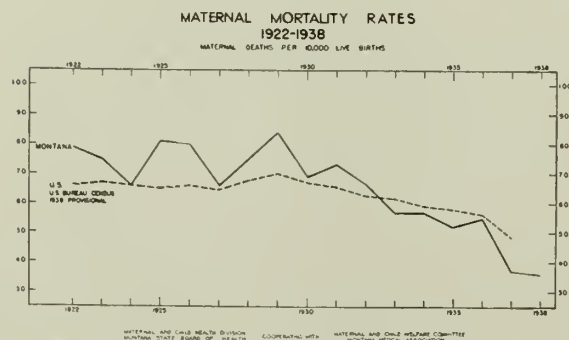


Fig. 1

†Chairman, committee on maternal and child health, Montana State Medical Association.

NUMBER OF MATERNAL DEATHS BY CAUSES
1933-1937

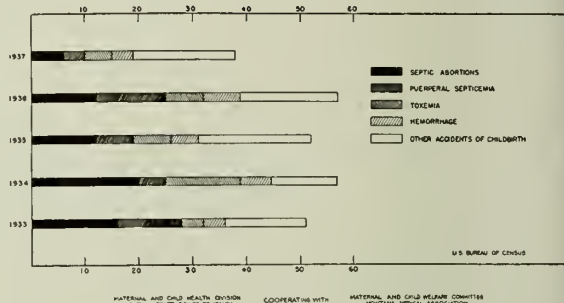


Fig. 2

provisional rate of 36 for 1938. Only six states in the Union had a lower maternal mortality rate than Montana in 1937. Connecticut with 25 deaths per 10,000 live births had the lowest rate for that year. What factors have brought about this marked reduction? What can be done to bring about a lower rate? As only 38 deaths from puerperal causes were listed in 1938, study of these deaths is of no statistical significance. However, it is notable that in the opinion of the attending physicians, 16 or 41 per cent of these deaths could have been prevented had the women reported for early antenatal care.

As the total number of births each year is only slightly over 10,000 in the state, the number of maternal deaths each year is low. A comparison of the causes of maternal mortality for the years 1933 to 1937 is shown in Figure 2. There are and always will be certain hazards related to childbirth and there will be some maternal deaths despite all that education and medical and nursing care can offer. In the year 1937, septic abortion, septicemia, toxemia and hemorrhage, the four conditions in which there is the greatest possibility of prevention, caused 50 per cent of the maternal deaths. In 1933 these same causes accounted for approximately 70 per cent of the deaths.

In the five year period, 1933-1937, 27 of the 56 Montana counties have had fewer than 500 births. In the counties having less than 500 births, one death may make a great difference in the rate for that county, and therefore interpretation of maternal death rates must take into consideration the number of births. The five year maternal mortality rate for Montana was 51 per 10,000 live births. The twenty-one counties shown in black in Figure 3 had a mortality rate higher than the state rate. Seven of these counties—Sanders, Mineral, Beaverhead, Broadwater, Teton, Golden Valley and Carter had less than 500 births for the period studied

MATERNAL MORTALITY
1933-1937

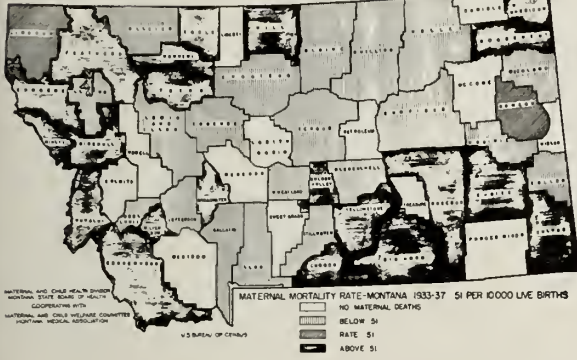


Fig. 3

while the remaining fourteen counties had 500 or more births.

The infant mortality rate for Montana since 1922 as compared with the United States rate is shown in Figure 4. This rate in Montana has dropped from 70 per 1000 live births in 1922 to 50.2 in 1937 with a provi-

INFANT MORTALITY RATES
1922-1938

INFANT DEATHS UNDER 1-YR PER 1000 LIVE BIRTHS

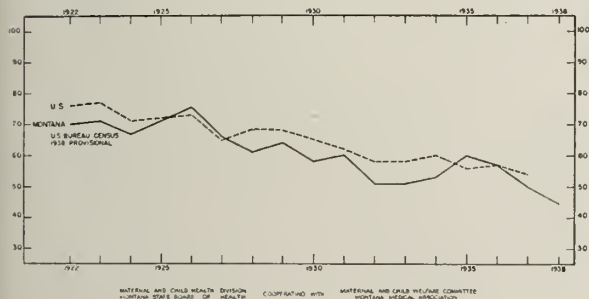


Fig. 4

sional rate of 45.2 for 1938. In 1937, 22 states in the Union had a lower infant mortality rate than Montana, New Jersey taking first place with an infant mortality rate of 39 per 1000 live births.

The age distribution of infant deaths is shown for a ten year period in Figure 5. It is significant to note that although the infant mortality rate during this ten year period has been materially reduced, there has been no reduction in the percentage of infant deaths occurring in the first day of life or the first week of life. There has been some reduction of deaths in the first month of life. Over 25 per cent of the infants who die, die under one day of life, over 45 per cent under one week of life and over 55 per cent under one month of life. If the infant mortality rate is to be lowered, attention must be directed to care of the newborn and care during the neonatal period and to the conditions associated with prenatal and natal care. The responsibility of the obstetrician in relation to these infant deaths is probably greater than that of the pediatrician.

INFANT MORTALITY
1927-1937

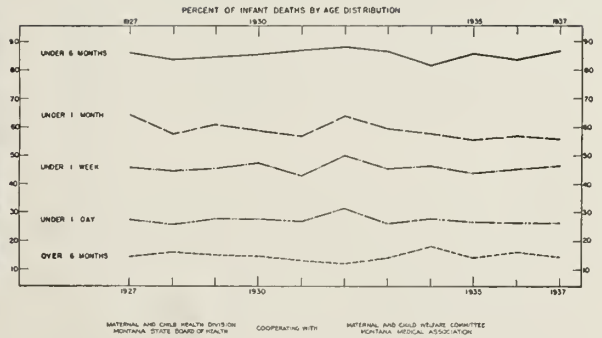


Fig. 5

The average infant mortality rate in Montana for the years 1933-1937 was 54 per 1000 live births. Twenty-two counties having a rate higher than the state rate are shown in black in Figure 6. Again the rates must be interpreted in relation to the number of births. Ten of these counties, Sanders, Teton, Jefferson, Meagher,

INFANT MORTALITY
1933-1937

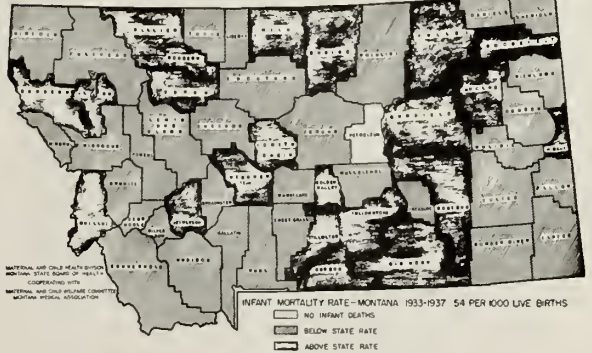


Fig. 6

Judith Basin, Golden Valley, Stillwater, Garfield, McCone and Wibaux had less than 500 births in the five year period. Some of the county medical societies are instituting a special study to determine the cause of their high infant mortality rate.

Responsibility for reducing the maternal and infant mortality rates to the lowest possible level must be divided between the state, the community, the individuals concerned and the medical and nursing professions. Each community has its individual problems; therefore, no nation-wide or state-wide program can be formulated which will meet the needs of all communities. Montana is a large state, sparsely settled with community problems varying from those in mining centers to those in the open range country. Birth certificates indicate that approximately 3 per cent of the women giving birth to live babies do not have a physician in attendance at childbirth. There are less than half a dozen women who practice midwifery in Montana. The majority of non-medical attendants are neighbors or members of the

family who attend the mother at childbirth because a physician is not available. Improved highways in recent years have made it possible for many more women to receive adequate maternal care, but there are still many women who live off the main highways and are unable to receive adequate care, either because of economic conditions or impassability of roads during certain times of the year.

Our changing economic trend has created new problems and some communities find themselves with many medical problems as yet unsolved. In some counties the large number of persons dependent upon some form of relief make it practically impossible for a county physician to render adequate care. In other counties the area is so great that it is impossible for one physician to cover his territory. In most counties the recompense for this work is pitifully small.

Good hospital facilities are an important factor if our maternal and infant mortality rates are to be lowered. The community must be willing to assume its share of the financial burden if good hospital service is to be maintained. Many hospitals, now poorly managed, would render adequate service if properly compensated for the care of the dependent group. Hospital standards for obstetric care have been formulated by the American College of Surgeons. Unless hospitals can maintain standards which will safeguard the lives of maternity patients, the question might well be raised as to whether the hospital is justified in accepting maternity cases.

In many small communities, maternity homes meet a definite need if a hospital is not accessible or if conditions in the home make home deliveries hazardous. These maternity homes are operated without any restrictions, provisions for inspection, or regulations for licensing. Provisions for licensing and inspection by the State Board of Health would safeguard communities against the hazard of questionable maternity homes.

Public Health Nursing service is also an important factor in maternal and infant care. Twenty-four of the 56 Montana counties now have such service. These public health nurses under the direction of the attending physician may go into the homes for health supervision of maternity patients, giving instructions to the mother regarding her care and the care of the newborn baby. They can assist materially in getting pregnant women under medical care in the early period of pregnancy. They can assist the physicians in home deliveries and supervise postpartum nursing care in the home. If the services of the public health nurse are to be utilized to the fullest extent in the maternal care program, physicians must understand the place of the public health nurse in the program and utilize her services for patients under their care who cannot afford private nursing services at the time of delivery and during the postpartum period.

Apart from the economic and social problems and the problems of adequate medical and nursing care, the educational aspect of a maternal care program is of vital importance. Many women and their husbands do not realize the importance of good medical and nursing care

throughout pregnancy, and do not seek this care even though it may be available.

It is felt that progress is being made through the joint efforts of the Maternal and Child Health Committee of the Montana State Medical Association and the Maternal and Child Health Division of the Montana State Board of Health. Funds have been made available to the Division under Title V of the Social Security Act administered by the Children's Bureau of the United States Department of Labor for maternal and child health and through state and local appropriations. The program of the Division of Maternal and Child Health is primarily educational. Through the facilities of the State Board of Health, a one year survey of all births in the state is planned. As there are only approximately 10,000 births each year in Montana, it is reasonable to assume that statistical data can be obtained for a high percentage of these births. It is only by a study of all births that we may arrive at any conclusion in regard to the problems of maternal care in Montana.

Each woman in the child bearing age should be aware of the importance of good medical care throughout pregnancy. But even before this, each individual should, through a widespread health education program, realize the importance of good health. Adequate care during the pregnancy, labor and puerperium will prevent a large number of maternal and infant deaths. The individual must be educated to demand good care during this period. It is equally important that the husband be educated. Approximately 25 per cent of the expectant mothers in Montana receive a monthly letter from the State Board of Health advising them about their care. These letters are sent on request of physicians, nurses and mothers themselves.

The art and science of obstetrics must be recognized as an important division of medicine. Each graduate from a medical school should be more carefully trained in obstetrics than in surgery since practically all practitioners engage in obstetric practice whereas surgery is usually undertaken by those who have received special training. Each State Board of Medical Examiners should demand that the candidate for a license to practice medicine have adequate clinical experience in addition to a fundamental training in obstetrics. Each physician accepting obstetric patients should be prepared to render adequate care during the pregnancy, labor and puerperium.

Postgraduate courses in obstetrics and pediatrics are being planned for the coming year in Montana. A Hospital Obstetric Association is being formed through the cooperation of the Montana Hospital Association. It is the purpose of this group to study all hospital births, analyze material and hold periodic meetings to discuss the problems which arise. A study of the care of premature babies is being planned for the coming year. The district medical societies are being encouraged to form committees to study maternal and child health problems in each community. A state-wide conference on maternal and child health is being planned.

It is the plan to use every opportunity for extension of the educational program through the press, magazine articles, radio, special publications of the State Board of Health and through meetings with professional and lay groups.

SUMMARY

The maternal and infant mortality rates in Montana have improved since 1922. It is estimated that 40 per cent of the maternal deaths are still preventable, and it is evident that the infant mortality rate can be reduced and will be materially influenced by better prenatal and

natal care. A state-wide study of all births is planned for one year. Coöperation between the Maternal and Child Health Division of the Montana State Board of Health and the Montana State Medical Association in the study of the problem in Montana should point the way toward the development of a program best suited to the needs of the state and should result in reducing the maternal and infant mortality rates in future years.

NOTE—Since completion of this article, the Federal Bureau of Census has reported the official maternal mortality rate for Montana in 1938 as 3.3 per 1,000 live births. The infant mortality rate for the same period was 45.5 per 1,000 live births.

Third Trimester Bleeding

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IN a recent article, Adair states that one-half the maternal deaths, one-half the infant deaths, and two-fifths of the still-births occurring in this country are preventable. It is believed that one million lives could be saved yearly by giving the expectant mother the full benefit of our present-day knowledge.

It is the purpose of this paper to discuss the diagnosis and treatment of abruptio placentae and placenta previa. The author is cognizant that it is unreasonable to attempt to follow a routine in the treatment of these cases. However, there are certain procedures which if followed in the management of these grave obstetric complications will eventuate in lowered maternal and infant mortality rates.

INCIDENCE

Prior to 1664 all hemorrhages taking place during pregnancy were thought to be the result of premature separation of the placenta. Paul Portal in 1664 demonstrated for the first time that the placenta at times was found attached to the cervix at the internal os. It was not until 1775 that Rigby differentiated between cases of separation of the placenta above the dilating zone of the uterus and those below that zone. If the milder instances of abruptio placentae are taken into consideration, the incidence of this condition is then greater than is commonly believed. Some degree of premature placental separation occurs in about one per cent of all pregnancies. Bland states that the more severe forms of premature separation of the placenta result in a maternal mortality rate of six per cent and a fetal death rate of sixty per cent. Comparatively rare is complete separation of the normally implanted placenta. This latter complication probably occurs not oftener than once in five hundred cases.

CAUSES

The causes of abruptio placentae are many, including pregnancy toxemia and nephritis, abnormalities of the endometrium and ovum, and injury. Toxemic disorders of pregnancy undoubtedly bear a definite relationship to abruptio placentae from the standpoint of etiology. Thus careful attention to good ante-natal care is a preventative to the occurrence of this serious complication. Repeated studies of the ovum, placenta, and endometrium have showed, as a rule, hemorrhagic infiltration of the decidua and myometrium.

PATHOLOGY

Following separation of the placenta, hemorrhage always occurs except in unusual instances where the fetus has been dead long enough to permit the occurrence of thrombosis of the uterine sinuses. Unfortunately the hemorrhage is not always visible. At times the bleeding is concealed. Massive hemorrhage may occur with no evidence externally of any bleeding. The usual picture, however, is external hemorrhage associated with the premature separation of the placenta. Rarely uteroplacental apoplexy occurs. In this condition there is diffusion of blood under the peritoneal covering of the uterus and infiltration of blood into the uterine muscle fibers resulting in degeneration of the latter. The blood vessels in these cases show endarteritic and degenerative changes. This condition is known as a Couvelaire Uterus.

DIAGNOSIS

Abruptio placentae usually occurs during the last trimester of pregnancy or during the course of labor. It is, however, possible for this condition to occur at anytime after the formation of the placenta. The most serious cases are generally seen during the last trimester. In-

stances of mild premature separation of the placenta during labor are common as can be easily determined by the most casual examination of the placenta after delivery. Fortunately, the milder cases occurring during the course of labor are not usually serious to mother and child.

The diagnosis of abruptio placentae is not difficult to make. The severity of the symptoms depends upon the degree of placental separation, the amount of blood lost, and the degree of shock. In the milder type occurring during pregnancy, there is usually a small amount of external hemorrhage and only slight pain that may be referred to the site of the placenta. In the more severe cases there is severe and sudden abdominal pain which is often described at first as being tearing in nature. Later the pain becomes dull in character. In many instances there is an associated nausea and vomiting with the onset of the pain. There may or may not be evidence of external bleeding. One should always bear in mind that a concealed hemorrhage of sufficient magnitude to produce shock may occur, a fact that unfortunately is too often forgotten. On examination, the uterus may be much larger than it should be for the corresponding period of gestation. It may increase in size before the examiner's eyes. The uterus in the severe type has a board-hard consistence, so that the fetal parts as a rule can not be outlined. Examination of the abdomen causes the patient pain. In some instances the uterine musculature remains soft and flabby which findings may lead the attendant to an erroneous diagnosis. In most of the severe types labor pains begin shortly after the onset of the abdominal pain.

Both mild and severe types of abruptio placentae may, and do, occur during labor, the milder forms being more often observed. The signs and symptoms are the same as for the cases which develop during pregnancy.

TREATMENT

Every obstetric case is a potential surgical emergency and a man need only encounter a case of abruptio placentae to realize this fact. It is impossible to set forth a definite procedure to be employed in the management of these cases. I know of no other complication in pregnancy which calls for such rigid individualization of each case. No single therapeutic plan is applicable to all cases.

MILDER FORMS

When these occur during pregnancy, expectant form of treatment combined with supportive measures have given us the best results as evidenced by a low maternal mortality rate. The milder forms more often occur during the course of labor and usually toward the end of labor. During the course of labor if the patient suddenly begins to bleed, one's first thought is of an abruptio placentae. Vaginal examination at this time will usually reveal whether we are dealing with abruptio placentae, low implantation of the placenta, rupture of the uterus, or cervical laceration. If the membranes are intact, they should at once be ruptured. In the event that the bleeding is due to low implantation of the pla-

centa, this procedure will ordinarily cause the hemorrhage to cease. If the bleeding continues, one is probably dealing with abruptio placentae and one's attention should be then directed at immediate delivery especially if the bleeding is profuse and the fetal heart tones irregular. At this stage there are several procedures from which the attendant may choose. The cervix, if not completely dilated, must be enlarged by manual dilation or by lateral incisions in the cervix. Then forceps may be applied to the head in cases of cephalic presentation and delivery completed. In the event of breech presentation, extraction should be resorted to after completing cervical dilation. Gentleness should characterize all these procedures. In the past, vaginal cesarean section and internal podalic version have been advocated by some men, but for the most part these procedures have given way to the less difficult operations. Following completion of the second stage of labor, the placenta usually delivers spontaneously. If it does not, then one must resort to manual removal. This should be done gently and with every precaution exercised to guard against infection.

SEVERE FORMS

In the severe forms of abruptio placentae, it is imperative to make an immediate diagnosis and to institute immediate treatment. There is no expectant treatment in the severe forms of abruptio placentae. If we are to save the patient, we must empty the uterus, stop hemorrhage and combat blood loss and shock. That treatment which empties the uterus quickest and with the least danger to the mother is the best treatment. Again one cannot set forth a definite plan which is applicable to each and every case. Many factors must be taken into consideration such as the severity of the situation, the presence of pregnancy toxemia, the age of the fetus, the size of the pelvis, the condition of the cervix, and the environment. It is pertinent here to state that every woman who has bleeding during the last trimester should be removed to a well equipped hospital. With our present-day highways and modes of transportation, difficulty in removing a patient to the hospital is minimal. Any dangers incident with transporting to the hospital a patient with this grave complication are far outweighed by the advantages offered by a properly equipped hospital. If the patient is in shock, this must be combatted before any attempt at delivery is made. Whole blood transfusion should be given as soon as possible. Parenteral fluids must be administered if there is any delay in giving blood. Five hundred to one thousand cubic centimeters of six per cent acacia may be used intravenously. Hypertonic glucose solutions should not be given, because they draw fluid from the tissues and increase the coagulation time of the blood. One thousand to fifteen hundred cubic centimeters of a five per cent glucose solution in distilled water or normal saline may be used intravenously. External heat applied to the body is of great value in the treatment of shock and is a procedure so simple that it is often overlooked. When shock has been combatted, the attendant should then follow a carefully selected plan of treatment. It is at

this point that good judgment must be exercised if the patient is to be saved. The management of abruptio placentae has undergone some very definite changes during the past ten years. Normal and instrumental dilatation of the cervix, application of a bag, version and extraction, and high application of the forceps are not nearly as often employed in the management of these cases as they were a decade ago. The decrease in popularity of these procedures has come about because of the dangers incident with their employment and because of the increased maternal mortality. The rapid and forceful dilatation of the cervix with forceful delivery of the child cannot be too vigorously condemned. Many mothers and babies will be needlessly sacrificed if such is practiced.

If the cervix is partly opened and softened, one may complete the dilatation manually and resort to forceps and extraction or version and extraction depending upon the engagement of the head. These procedures, however, are certainly not without danger. Manual dilatation of the cervix may result in increased bleeding and add shock to the patient who already is in a precarious state. If the child is dead, one should seriously consider craniotomy, a procedure which I suspect is not utilized as often as it might be.

If the cervix is only partly opened and not effaced, the best results by far will be obtained by resorting to abdominal cesarean section. The low cervical cesarean section under local infiltration anesthesia offers the best results. Patients with severe pregnancy toxemia, especially the eclamptic, are poor candidates for abdominal delivery. In this latter group local infiltration anesthesia offers the best chance for the patient. In the less severe forms of abruptio placentae complicated by pregnancy toxemia, one should consider employing metreurysis or Braxton-Hicks version.

The gravity of the situation does not end with the delivery of the child and placenta. Postpartum hemorrhage in these cases is not uncommon. The bleeding occurs usually because of atony of the uterine musculature. Careful attention to uterine contraction will mean controlled blood loss. Pituitrin and ergonovine should be employed. The latter may be used intravenously. Pitocin rather than pituitrin should be used in the pregnancy toxemias. If delivery from below has been done and the bleeding continues, the uterus should be carefully packed. If the delivery has been via the abdominal route and bleeding continues in spite of the use of pituitrin and ergonovine, it may be necessary to resort to hysterectomy.

Throughout the management of these cases the watchword should be "save blood." Blood transfusion should be resorted to before, during, and after delivery if necessary.

CONCLUSIONS

1. If the milder forms are considered, abruptio placentae is more common than is generally supposed. It probably occurs in one per cent of cases.

2. Pregnancy toxemias have a definite causative relationship to abruptio placentae.

3. Vaginal examination should never be done in any suspected case of abruptio placentae until the patient is in a well equipped hospital and all preparations have been made for immediate operative procedures.

4. Each case of abruptio placentae must be individualized. There is no set procedure which is applicable to all cases.

5. In the mild forms, expectant treatment in conjunction with supportive measures offers the best prognosis.

6. In the severe forms, active interference is necessary in the interests of the mother.

7. Blood transfusions should be employed before, during, and after delivery if necessary.

PLACENTA PREVIA

The lower edge of the placenta must be at least ten centimeters above the internal os to be in normal position. When the lower border of the placenta lies just at the level of the isthmus uteri, it is known as low implantation of the placenta. When the placental edge just reaches the internal os it is called placenta previa marginalis. When only part of the opening of the cervix is covered by the placenta, we speak of placenta previa lateralis. When the os is completely covered by the placenta, it is known as placenta previa centralis.

Findley in a study of 21,706 cases found an incidence of one placenta previa in 159.6 cases. Holmes states that a conservative estimate is one in 1000 cases.

The cause of placenta previa is not known and therefore there is no prophylactic treatment for this condition. Greenhill has attempted to show that fetal deformities occur more frequently in placenta previa than otherwise. Murphy on the other hand has found no unusual frequency of association between placenta previa and fetal malformations.

DIAGNOSIS

Hemorrhage is the first and most constant symptom in placenta previa. The bleeding is painless. Every case of painless and causeless bleeding occurring during the last trimester should be considered placenta previa until proved otherwise. The amount of bleeding varies. It may be only slight at first or it may be very profuse. As a general rule each succeeding hemorrhage is more severe. The history of the painless bleeding is the most important diagnostic aid. The diagnosis must be confirmed by vaginal examination; but no examination should ever be done in any case of bleeding during the last trimester until the patient is in a well equipped hospital and all preparations have been made for immediate operative delivery. Alarming hemorrhage may follow the most gentle vaginal examination in these cases. Beck and Light in 71 cases of third trimester bleeding examined by X-ray were able to diagnose correctly placenta previa in 76.5 per cent of all the cases. Its absence was diagnosed correctly in 92.6 per cent of the cases. Ude, Weum, and Urner have visualized the bladder by means of radio-opaque substance and have thus been able to ascertain the relationship between the

bladder and presenting part. Prentiss and Tucker believe that air cystograms are more accurate than cystograms made with liquid media. The X-ray when used serves merely as an aid to the history and the clinical findings. The diagnosis of placenta previa is made by the history and the findings at the time of the vaginal examination. If the placenta is felt at the edge of the os, it is the marginal type. If the placenta incompletely covers the os, it is the lateral type. If the os is completely covered by the placenta, it is the central type. Placenta previa centralis can only be absolutely diagnosed when the cervix is completely dilated. The dangers to the mother and baby increase according to the degree of placenta previa.

TREATMENT

During the past ten years the management of placenta previa has changed even more than the management in cases of abruptio placentae. The change in the management of these cases has undoubtedly resulted in a better prognosis for both mother and child as evidenced by the reports in the current journals. The improved results have probably occurred because of a combination of factors such as improved operative technique, local anesthesia, early diagnosis, employment of blood transfusions, better equipped hospitals, and less untimely and needless interference. Adoption of the cesarean section has undoubtedly contributed a great deal to the decrease in the maternal mortality during the past ten years. Although the incidence of cesarean section in these cases has doubled during the past fifteen years, the maternal mortality has been more than halved.

Any woman with vaginal bleeding during the last trimester should be hospitalized at once. Absolutely no rectal or vaginal examinations should be done until all preparations have been made for immediate operative delivery whether it be from below via the vaginal route or above via the abdominal route. The importance of this cannot be too strongly emphasized. If the patient has lost much blood, she should be immediately transfused. Saline, glucose and acacia solutions should be used while waiting for a blood transfusion. Even if the patient does not require a blood transfusion at the time of admission to the hospital, blood donors should be available at a minute's notice. The watchword should be "save blood." Once the diagnosis of placenta previa has been made the pregnancy should be terminated. If the bleeding is only slight and the baby near the age of viability, one may temporize a few weeks with the hope of obtaining a viable baby. If this course is adopted, the patient should be kept in the hospital, strictly confined to bed, and watched very carefully. Preparations should be made to terminate the pregnancy if necessary on a moment's notice.

LABOR

In placenta previa of the marginal type, the bleeding occurs as a rule late in the second state. The bleeding is usually slight. The treatment consists of simple puncture of the membranes. The placenta then retracts with the lower uterine segment and the presenting part serves

as a tampon. As a rule this is sufficient to stop the hemorrhage. If bleeding continues and the cervix is completely dilated, the labor should be terminated by forceps application and extraction or version and extraction.

More often, however, the case is one of hemorrhage with no dilatation of the cervix. There may or may not be labor pains. It is in this type of case that the attendant must exercise good judgment if he is to bring the mother through safely. The outcome of the case probably depends more upon the skill of the attendant than any other one factor. It is in this type of case that the management has changed so in the past fifteen years. Tamponade of the vagina and lower uterine segment is not generally used today. It is impossible to stop bleeding by this method in cases of placenta previa centralis. It is not an effective method at controlling hemorrhage in the other types of placenta previa. To tamponade the vagina is to predispose the patient to infection and thus make the case unsuitable for cesarean section if this must be resorted to later on.

Braxton-Hicks' version which was formerly employed is not much used today. It has been dropped from use largely because it is difficult to perform and because of the high maternal and infant mortality rates incident with its employment. The placental attachment to the lower uterine segment in these cases results in an extensive vascularization of the thin lower uterine walls. Thus manipulations through the birth canal, especially in the region of the lower uterine segment, are apt to result in lacerations and profuse hemorrhage thus complicating an already grave situation. Metreuryisis is not utilized as frequently today as ten years ago, its use having been discouraged by the high incidence of maternal and infant deaths associated with its employment in the treatment of placenta previa. If the bag is used, it is important to remember to remove the bag from the vagina as soon as the largest diameter of the bag has passed through the cervix. If this is not done, there may be a concealed hemorrhage in the vagina behind the bag. When the bag has been expelled or removed, the presenting part will usually be found low in the pelvis and acting as a tampon. If the head is not low and the bleeding persists then it becomes necessary to resort to forceps application and extraction or version and extraction.

The Willett forceps described years ago is now gaining popularity in this country. Davis and others who have used this method in this country recommend its use. This method comes into competition particularly with Braxton-Hicks' version and metreuryisis. Those who have used this method report its application relatively simple. The membranes are first ruptured. A firm grasp is then made on the fetal scalp with long volsellum-like forceps. The forceps are then attached to a cord which runs over a pulley and is attached to a one pound weight. As a rule the bleeding is brought under control and a spontaneous delivery is awaited. This method should be of value because it does not necessitate extensive manipulation in the region of the lower uterine segment. This method is applicable only in cases of

partial placenta previa. Those who have employed this method report no serious injury to the scalp of the child.

The third stage of labor may or may not be complicated. If there is little or no bleeding following the birth of the child, await the separation and delivery of the placenta. If there is more than a little bleeding from the uterus and the placenta has not delivered, a very careful manual removal must be done. Delivery of the placenta should be followed by intramuscular injection of pituitrin and ergonovine. The latter may be used intravenously. Should bleeding then continue, the uterus will require packing. In the event blood loss has been excessive the patient must be given a whole blood transfusion. Shock should be treated by methods described earlier in this paper.

Cesarean section should be resorted to in cases of placenta previa centralis unless the patient is in active labor and progressing satisfactorily with no loss of blood. Cesarean section should be employed in the previas of the partial type if the cervix is closed, or if the cervix is partially dilated and rigid. Delivery via the abdominal route obviates most of the undesirable manipulations through the lower uterine segment. As a rule there is less loss of blood when abdominal cesarean section is employed than when delivery has been accomplished via the vaginal route. In abdominal section the placenta is delivered immediately after the birth of the child and this contributes to the saving of blood. Abdominal section is not without dangers and serious complications. It appears that the incidence of infection is greater following cesarean section for placenta previa than for other obstetric complications. Only clean cases should be subjected to abdominal cesarean section. Should the case be infected, the section should be followed by hysterectomy. If troublesome bleeding occurs at the former site of placental attachment, hemostasis can usually be obtained by suturing the thin walled uterine

sinuses. The low cervical cesarean operation under local infiltration anesthesia offers the best prognosis because of lessened chance for infection. In closing, let me emphasize the importance of directing one's efforts at saving blood.

CONCLUSIONS

1. Painless uterine bleeding in the last trimester of pregnancy should be considered placenta previa until proved otherwise.
2. Every effort should be made to lessen blood loss.
3. Blood transfusions should be employed before, during, and after delivery when necessary.
4. Cases of placenta previa marginalis and lateralis with the cervix effaced and the os partially dilated or completely dilated may be managed by rupture of the membranes, forceps delivery, internal podalic version or Willett forceps.
5. Abdominal cesarean section offers the best prognosis for the mother and child in cases of placenta previa centralis and in the partial previas with undilated and uneffaced cervix.

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Care of the Healthy Baby

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UNTIL recently, perhaps one of the most neglected fields of medicine was the study of the care of the normal young child. One should aim not only to preserve health but also to actively promote physical fitness and mental and emotional well-being. These provide added duties for every physician who undertakes to furnish medical care for children. It is imperative that the personal physician to the child become as well versed in the means of preserving health and preventing disease as in waging a defensive battle at the bedside when a child is sick.

Infancy, being the period of greatest immaturity and most rapid growth, is the age of highest mortality and most unusual course of disease. More babies die during the first two weeks of life than during the remaining fifty weeks of the first year; and more die during these fifty weeks than during the next four years. By the middle years of childhood the tissues have become relatively much more mature and the body is relatively much more stable; hence we expect to find, as we do, lower mortality and the more usual response to disease. Lack of immunity during early childhood accounts for the

chief contrast between diseases of this age and in adult life, namely, a high incidence and somewhat different course of many of the infectious diseases.

Regular physical inspection will go far toward preventing illness in children. During the first six months the infant should be taken to the doctor once a month; during the second six, once every two months, and thereafter at six month intervals. By this means, if physical defects appear they can be treated early.

When parents bring the child to a physician for preventive rather than for therapeutic services, the physician must take the responsibility for discovering by means of carefully elicited history what, if anything, is wrong with the child's environment, his care or his habits. One cannot over-emphasize the importance of thoroughness in obtaining the history. While the physician is talking with the parents he has an opportunity to study the child himself, his relation to his parents and his reactions and his adjustments to his environment. This should furnish the background of all his work with the child. The physician should make a complete health examination and be prepared to employ in this connection all of the available practical methods of bringing to light early or hidden abnormalities of structure or function. For example, the roentgen ray should not be regarded as something to be used as a last resort, for information obtained by it is often of great value in detecting incipient disease and structural abnormality.

An example of the need for individualized physical examination, with the appropriate laboratory, and occasional environmental, studies of the child is offered by the child who manifests only minor departures from health. These conditions are so frequently encountered they may be falsely accepted as the inevitable. The list of such conditions is long and only the exceptional child is free from any of them. They include teeth decay, chronic fatigue, frequent colds, bed wetting, nail biting, food intolerance, chronic constipation, nervousness, and many others. Each should call for investigation of the factors contributing to its occurrence and an attempt made to correct it.

One of the most common of physical defects to which children are subject is a tight or spastic anal sphincter. When the child is constipated or has difficult and painful bowel movements, the physician should look for this condition. Careful digital stretching of the anal sphincter will remedy this. This digital manipulation may have to be repeated several times to effect a cure. However, constipation is much more frequently the result of faulty habits. Children would rather play than attend to the duties of nature. In my experience the drug habit, rather than curing constipation, enhances it. The use of cathartics other than mineral oil and occasionally milk of magnesia, should be discouraged. Enuresis and diabetes are conditions which may be merely habitual or otherwise. The physician who knows the child and understands his environment can best judge as to the proper methods of correcting these habits.

The infant's complete dependence on his environment for his sustenance makes vigorous dietary supervision

essential for his well-being. The child has a lower margin of safety in regard to his nutritive requirements and deprivation usually will give rise to disturbances of structure or of function which may or may not make themselves clinically apparent. Physical measurements become much more valuable if obtained at successive intervals on the same child and comparisons made as to the rate of gain. The simplest means of measuring growth in babies is by the periodic recording of weight. During infancy, in the absence of any apparent disease, a satisfactory weight gain from month to month may usually be taken as evidence of adequate feeding, good nutrition and healthy growth. A factor of safety will be added to this estimate if height is also recorded. Such measurements, however, particularly in later childhood, may not reveal the perversions of nutrition which may reflect themselves in alteration of the tissue turgor, color of the skin and mucous membranes, degree of alertness, disturbed sleep, or other signs of chronic fatigue. Dental decay and habitual constipation frequently are evidence of perverted nutrition. Resistance to infection may be greatly reduced by deficient diet. The effects of deficiency of vitamins A and C are noteworthy in this regard, and inadequacy of vitamin B under certain circumstances may exert a similar effect. The following table gives the usual developmental achievements of babies at different age levels. Variations may be found but should suggest the need for a search for some disorder.

Birth—	Vigorous nursing, purposeless grasping.
2 to 4 months—	Holds head up independently, notices surroundings, purposeful grasping.
5 to 9 months—	One or more teeth, sits with support.
6 to 10 months—	Crawls, stands with support, improved coordination.
10 to 15 months—	Stands alone, walks with support, coordinated play, ± established stool habit, ± feeds self.
12 to 18 months—	Says single words, walks alone, six to twelve teeth, ± established stool and urine habit.
18 to 24 months—	Walks well, runs, twelve to sixteen teeth, coordination improving, says many single words, ± some phrases.

The existence of a preliminary period of difficult adjustment in the first two or three months of life has also been insufficiently emphasized in the literature. That the child needs time to adjust to the rhythmic conditions of living and the mother, in her weak and emotional state, to her new responsibilities is not sufficiently understood. Individual differences in infants, with respect, for instance, to food and sleep requirements, are too little stressed with the resultant undue anxiety on the part of those mothers whose infants deviate most from the accepted standards, even though such limits fall within normal limits of variation. Reassurance is often necessary. For instance, the average number of hours of sleep per child during the first two years is usually less than the amount recommended as desirable in the publications of the U. S. Children's Bureau. In their pamphlet entitled *Infant Care*, it is suggested that children should sleep twenty to twenty-two hours per day in the early weeks of life and fifteen hours per day at the end of the first year. Washburn and Putnam in their study of fifty-nine children found an actual average of sixteen

to seventeen hours in the early weeks of life and thirteen to fourteen hours at the end of the second year.

Mothers should receive common sense instructions concerning the wearing apparel of infants, exercise, and training to habits of regularity. The practicing physician should always be in possession of information concerning these details and should be ready, willing and anxious to answer questions propounded by mothers. It is his obligation in the care of the infant.

Physical, mental, and environmental factors are inseparably interwoven in the development of the child. Child psychology to me means applied common sense. Every child cannot be expected to follow a single pattern or flourish under the same rule of guidance. Knowledge alone never made a good parent. The parent who parcels out affection in carefully measured doses by "rule of book" is taking her responsibility too literally. Affection is a feeling that needs a spontaneous and natural expression. While affection and careful attention are essential to the child, they are often carried entirely too far. To the child's detriment, devotion frequently displaces intelligence. From the first the infant should be taught regularity. He should be fed at regular intervals and not fed between meals. He should be made comfortable in his bed and not repeatedly picked up or played with. As he grows older he should be put to bed in a dark room. He should never be frightened. A child brought up in this manner usually does not know the word "fear". For instance, when he is frightened of the doctor, what can one expect other than that he will fight, scream and cry at the doctor's visit. Every child should learn to mind from infancy. A child scratching, slapping, kicking and even at times cursing his mother is indeed a sorry sight, but I believe it is the parents' and not the child's fault.

The importance of an understanding of the emotional aspect of the feeding of infants is too little appreciated. The most important aspect of the emotional problem in infant feeding is recognition that the problem exists and to a large degree may be prevented if the physician has insight and understanding of the personality of the mother and takes pains to prepare her to meet situations that are bound to occur in every case. Here, if anywhere, "an ounce of prevention is worth a pound of cure." We should pity the child who feels he is doing the family a favor by eating his spinach, who refuses his food unless mother makes a game out of eating, or father cuts antics on the floor or makes a monkey out of himself in some other manner. If the situation has not progressed too far and such a child is removed from his home environment he will soon eat a sufficient quantity and without coercion. In such cases it isn't the child, but the family who needs treatment. A child can be made a pleasure or he can be made the greatest little pest in the world, and whichever he turns out to be depends largely upon the parents.

In plain English, the child should be fed; he should be required to rest—not necessarily sleep—at regular hours; he should be given an adequate amount of affection so that he knows that those around him love him;

he should be taught to mind and should not be shown too much attention. One rarely sees a child thus trained who must be forced to eat, for he takes his food as a matter of course. He is taught that things given him are good for him and he never has any other idea.

Our obligations in caring for the infant cannot be regarded as being fulfilled until we have at least immunized the child against diphtheria and smallpox. It should be remembered that the natural immunity against most communicable diseases usually terminates about the sixth month of life. Certain of the contagious diseases of childhood are much more serious if they occur when the child is under five years, and particularly if they occur under one year, than if they are delayed until after five years, or better still after ten. Hence the physician should be particularly careful to keep young children from coming into contact with these diseases and particularly watchful when they do occur. At the present time one of the best means of actively immunizing an infant against diphtheria is by the administration of two 1 cc. doses of diphtheria toxoid. The second dose follows the first after an interval of three weeks. Alum precipitated toxoid, if used, should be given in two doses of 1 cc. each. The best time to immunize a child to diphtheria is between the sixth and ninth months of life. For children over two years one should start with 0.5 cc., or less for the initial dose, because of the possible danger of obtaining a severe reaction. In the event of a reaction to the first small dose the same dose should be repeated on the next visit. According to statistics, alum precipitated toxoid has a slightly higher effectiveness in producing immunity but the reactions with it are frequently more severe. One should not fail to do a Schick test six months after the immunization. A positive reaction calls for a second series of toxoid.

Every child should be vaccinated against smallpox during the first year of life, a good time is at six months of age. In early vaccination the reaction is less severe and complications are less likely to occur. Most cases of vaccinal encephalitis occur in connection with a primary vaccination at a later age. The multiple pressure technic is now preferred to the old "cross-hatch scratch method." The intracutaneous method using River's vaccine is particularly useful when children with skin diseases require vaccination.

In certain localities a preventive measure which is not needed as a general procedure elsewhere may be called for routinely, as in the case of typhoid vaccination where typhoid fever is prevalent. In the case of very young children other specific measures like convalescent serum should not be overlooked merely because they are not suitable for use with all children. In regard to protection against measles the physician must exercise his best judgment in connection with the individual child. Measles is peculiar in that there is nearly complete immunity until after the fifth month, that it is relatively mild in the latter part of the first year, more severe in the second and third year, less dangerous in later childhood, and again, if one may trust statistics, more severe in adult life. While measles is not, as a rule, a very seri-

ous disease, in private practice in a healthy child of a favorable age, it is nevertheless a treacherous disease with potentially serious complications and sequelae and the use of serum, especially convalescent serum, offers a valuable therapeutic procedure that may well be used extensively. Four to 10 cc. of convalescent serum or 2 cc. to 6 cc. of placental extract will prevent or modify the disease, depending upon the dosage and the time after exposure that the serum is given.

Whooping cough is a very serious and often fatal disease in infancy and in those who are debilitated. Vaccination against whooping cough is now being advocated as one of the routine immunizations. The most popular and probably the best method is with the use of the Sauer double strength vaccine, or a vaccine made in a similar manner. This is administered in the second half of the first year, preferably at the seventh or eighth month of life, at which time the infant's power to develop immune bodies is said to reach a maximum. The vaccine is given subcutaneously at weekly intervals, in three doses of 1 cc., 1.5 cc., and 1.5 cc., a total of 80,000 million killed *H. pertussis* bacteria being given. About 70 per cent of all nonimmunized children exposed to pertussis will contract the disease. If parental serum, obtained from parents who give a definite history of having had pertussis is given early in the incubation period to exposed children the disease will be prevented in 60 per cent, and in the remaining 40 per cent the disease will be distinctly milder. If convalescent serum is obtainable it should be used, for about 85 per cent of exposed children will be protected and the remainder will run extremely mild courses. Twenty to 40 cc. of the parental serum should be given intramuscularly, or 10 cc. to 20 cc. of convalescent serum; the dosage depending upon the patient's age and the time elapsed since his first exposure to the disease.

There is still much discussion as to whether it is advisable to immunize a child to scarlet fever. Active immunization through three injections of increasing doses of scarlet fever streptococcus toxin, weekly for five weeks, is of value but the reactions obtained are often so severe that one hesitates to recommend the procedure. Furthermore, the degree and duration of immunity obtained have not been definitely established. If such a procedure is contemplated the Dick test for susceptibility to scarlet fever should first be given. The disease can usually be prevented in an exposed child by the intramuscular injection of 10 cc. of convalescent scarlet fever serum. Fifteen to 20 cc. should be given for older children. Such a passive immunity has a usual duration of about two or three weeks, and prevents the disease in 97 per cent of all children receiving the serum.

Chickenpox is a relatively mild infection and so contagious that it is a question whether it is worth while to avoid its spread to other children in a family. In the rare case in which it is desirable to protect a particular

child from this disease, immune serum or placental extract may be employed, but only with fair success.

Mumps is almost unknown during the first year of life. It is a relatively mild, uncomplicated disease during early childhood. Our chief concern should be for the father.

Childhood infection with tuberculosis takes place much more frequently than it should. Tuberculosis of bovine origin is the direct result in every instance of the failure to observe simple, known, sure protective measures. Raw milk and milk products are the only sources from which this infection takes place. Boiling the milk and using foods made only from pasteurized milk will effectively eliminate bovine tuberculous infections in children. The only way in which infection of children with tuberculosis of human origin can be controlled is by preventing children from being exposed to persons with open tuberculosis.

In conclusion, I should like to emphasize that the health of the child is the responsibility of the family physician and not of the health agencies. If matters of routine health examinations, immunization procedures, and other affairs of preventive medicine are used by the schools and other agencies, the breach between the people and the practitioner of medicine will be widened and a false separation between matters of health maintenance and of treatment of disease will be made. As a consequence, all parties will suffer. The desirable type of individualized periodic health examination can best be obtained through the family physician. Ideally, the child should be under periodic observation of such a physician from the time of its birth; problems can then be met before they arise. The hazards of disease can be markedly lessened through the institution of immunizing procedures before the child has completed his first year of life, and through the wise supervision of his nutrition and his habit formation throughout his formative period much more will be accomplished than by the management of such procedures by health agencies or as a prelude to school attendance.

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Injuries to the Newborn

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INJURIES at birth are usually quite easy to recognize if time is taken to completely examine the child. Usually the obstetrician is aware that such an injury has taken place; however, during the stress of a difficult delivery these injuries may be overlooked and recognized only after a complete check of the infant. Even in an apparently normal delivery such an accident may arise, so it is well to be sure that nothing is overlooked.

Skull depression is a trough-like depression involving either the posterior parietal or the frontal bone. It is caused by pressure of the head against the promontory of the sacrum and is found only after a difficult labor. Symptoms, however, are generally absent unless there is a considerable pressure resulting from the depression. The depression, if not severe, usually corrects itself unless accompanied by a fracture of the internal or external table of the skull. One may sometimes reduce those which do not reduce spontaneously by pressure exerted opposite the depression. In the frontal area it is necessary to cut down to the bone, insert a bone screw and lift the depressed area.

When fractures of the spine occur, they are as a rule, the result of a difficult delivery of the after-coming head. The sixth cervical vertebra is usually involved and is accompanied by massive hemorrhage into the spinal canal, which injury generally results in death.

Fracture of the clavicle is the most common of all fractures and is often overlooked until one notes a small mass of callus formation at the point of fracture, occurring most frequently at breech presentations, caused by pressure of the fingers over the clavicle. In vertex positions, the width of the shoulders is probably the deciding factor. Examination of a suspected fracture may go unrecognized until callus formation has taken place and the accompanying enlargement noted. The condition may be suspected if the Moro reaction is employed and the affected arm does not rise to complete the encircling response of the opposite arm. X-ray will always confirm the diagnosis. It is to be distinguished from brachial birth palsy and fracture of the humerus.

Humerus fractures, when occurring, accompany breech delivery, where an arm is brought down over the face, or may follow version followed by extraction, and, occasionally, they are said to be due to pressure of the humerus against the sacral promontory. Injury to the musculo-spiral nerve may result from such a fracture.

Fractures of the forearm are rare, as are those of the femur which are even more rare and are usually the result of version and extraction, or of the manipulation of the infant during delivery by cesarean section. The leg is extended vertically as in the treatment of fractures of children.

Birth injuries of the eye are, with few exceptions, due to the pressure of the forceps directly over the eye, or

indirectly due to the compression of the skull. Fracture of the orbital bones may not cause symptoms but may be accompanied by ocular palsies. Exophthalmus may result from hemorrhage behind the globus. Rarely does such a hemorrhage cause atrophy of the optic nerve. Opacities, caused by an edema of the cornea, disappear shortly whereas opacities, caused by a ruptured cornea, are permanent. Hemorrhage may take place in the various anatomical portions of the eye without lasting damage. Retinal hemorrhage is not of serious consequence.

Caput Succedaneum is an area of edematous swelling, usually located over the parietal and occipital regions of the head, but also located at times over other parts of the body. It is the result of the contractions and relaxations of the uterus and occurs over the part presenting at the cervix. It is formed by the infiltration of lymph and sometimes blood from lymph and venous stasis. Swelling of the genitalia in breech presentations and edema of a presenting arm or leg are corresponding conditions. Treatment is unnecessary unless infections result, which rarely occurs.

In cephalematoma there is a hematoma formation beneath the periosteum, which is usually external but may be internal, in which instance the blood is between the dura mater and the bone and is much more rare than the afore-mentioned condition. The mechanism of formation is much the same. It is much oftener seen in the first child and in difficult labors. During the first few days, the swelling is firm and becomes soft in a day or so, and an irregular margin, due to the deposit of lime salts, develops at the base. Usually the condition has cleared by the time of discharge from the hospital. It can be distinguished from caput succedaneum, in that it will go up to a suture line, but will not cross. It may occasionally have to be distinguished from cephalocele or meningocele, in which conditions the tumor lies over a suture line. On occasion, the tumor mass enlarges in the presence of a hemorrhagic disease, but ordinarily the outcome is favorable. Bone cyst has been reported following this condition.

Hematoma of the sterno-cleido mastoid muscle is most frequently seen following breech presentations and is usually unilateral. It is first noted several days following delivery. The swelling is hard and is not freely movable, and the infant will favor this side of the neck and object to movements of the head. It is not thought to cause wry neck of a permanent character. As a rule the mass absorbs over a period of several weeks so that no treatment is necessary. It is sometimes confused with an adenitis.

Facial paralysis is the most common of the peripheral nerve paralyzes. Obstetrical paralysis, resulting from forceps delivery, is due either to direct pressure on the nerve as it leaves the facial canal or to trauma, swelling

or hemorrhage in this area. It is usually unilateral and is always peripheral. The face on this side is smooth, there is no wrinkling of the forehead, there is partial closure of the eyelids, the corner of the mouth droops and the naso-labial fold is absent or obliterated. The condition is exaggerated when the child cries. This type of paralysis is transient in nature and usually disappears in a few days. The condition needs no treatment other than is directed to bruising and swelling. If the nerve is cut, the paralysis is permanent. In those cases where severing of the nerve has occurred, suturing the nerve, after waiting several months to see if spontaneous recovery does not take place, has resulted in some cures.

Rarely does the facial nerve become involved as a result of a central lesion, caused by a skull fracture or hemorrhage resulting from forceps delivery. However, when it does occur, wrinkling of the forehead is not involved, although other muscle groups usually are, where such a lesion takes place.

Obstetric paralysis due to inherent pressure factors may be divided into two groups, those due to antepartum compression and those due to intrapartum compression. The latter nearly corresponds to the type known as forceps trauma, but the injury is due to the pressure of the head against the bony prominences of the pelvis. It occurs in prolonged labor where the baby is large or the pelvis abnormal. It is likewise due to direct injury of the nerve, or the result of hemorrhage or edema. Recovery often occurs. Antepartum compression paralysis is due to the abnormal position of the fetus in relation to its own parts, or to non-yielding surfaces of the mother. Cranial and facial asymmetry accompanies the paralysis. The skin on the involved side is thin; the temporal, the parietal areas, and the lower jaw are flattened; the ears depressed. This is a peripheral type of nerve lesion, and the outlook for nerve recovery is unfavorable. Usually the pressure, resulting in complete atrophy of the nerve, has existed for some time.

Spontaneous or non-obstetric paralysis may be unilateral or bilateral. The cause of this type is not well understood, but is thought to be due to nuclear agenesis. Consequently the chance of spontaneous recovery or successful treatment is very poor.

Brachial birth palsy, with the exception of facial palsy, is the most common of the peripheral nerve injuries. It is caused by direct trauma to the brachial plexus, due to over-stretching. It may result from the delivery of the after-coming head, where traction has been made on the shoulders with the index fingers over the brachial plexus. It may be the result of an arm slipping over the head, thereby putting the tension on the brachial plexus, where it comes under the clavicle. Sometimes it is due to pressure on the lower portion of the neck and shoulder during labor if the pressure is prolonged. The nerves may be injured through over-stretching or may be severed at their trunk. This condition is most often found in forceps and breech deliveries.

Two types of brachial nerve palsy are recognized. The most common type is known as Duchenne-Erb paralysis.

The upper arm is involved and usually the right arm. It is seldom bilateral. Injury to the fifth and sixth cervical roots, or the trunk formed by them, causes this syndrome. The muscles usually involved are: the deltoid, supra spinatus, infra spinatus, teres minor, biceps, supinator longus, and occasionally, the serratus magnus and coraco brachialis. The arm is limp, is extended and inwardly rotated, with the shoulder depressed. The child cannot abduct, elevate, outwardly rotate or supinate the arm. Klumpke's paralysis is the lower arm type and is much less frequent. This involves the seventh and eighth cervical and the first thoracic nerves or the trunk formed by their union. It is the result of breech or face presentations. The muscles involved are those innervated by the ulnar and median nerves. The paralysis affects the small muscles of the hand, some muscles of the forearm and the triceps. The hand is flail-like, and the grip is lost. The lower arm is flexed on the upper arm. Sensation is more impaired in this than in the upper arm type. Oculopupillary symptoms, namely the narrowing of the palpebral fissure and contraction of the pupil, are present when the sympathetic fibres in the first thoracic nerve are involved. In addition to these two palsies, the entire arm may be involved, also mixed forms have been reported, as well as involvements of single muscles.

These cases are to be differentiated from other palsies resulting from birth injuries of the cranial type, fracture of the clavicle or humerus, and dislocations which may simulate obstetrical palsy.

The possibility of this type of obstetrical paralysis should be recognized in all difficult labors and especially in breech deliveries and exceptional care taken to avoid them where possible. When the paralysis has taken place, the arm should be put at absolute rest and in a position so that the brachial plexus will not be under tension. Several weeks are usually required for recovery. If no recovery has taken place over a period of a year, operative interference may be attempted. Many of these fail, so one's hopes should not be too high; however, in a few instances, the results are satisfactory, which makes the effort worth while.

Paralysis of the phrenic nerve is a rare type of palsy, and occurs usually with an accompanying injury to the brachial plexus, of the lower arm type, since the phrenic nerve comes off the third, fourth, and fifth cervical nerves. This paralysis appears within twenty-four hours after delivery and is associated with respiratory difficulty, resulting in cyanosis and rapid breathing. The breathing is of the thoracic type, in contrast to the usual abdominal variety found in infants. The diagnosis is aided by fluoroscopic examination where a see-saw movement of the diaphragm is noted, as well as a to-and-fro movement of the mediastinal content.

The condition is to be differentiated from congenital heart disease, intracranial hemorrhage, atelectasis, and diaphragmatic hernia. These can be ruled out by using the fluoroscope and by noting the usual accompanying brachial plexus palsy.

Lumbar palsy, with its involvement of the lower extremities, is rare, and usually follows traction on the legs

during breech deliveries. It is not to be confused with hemorrhage into the lower portion of the spine.

Injuries to the internal organs are recognized, and practically all are the seat of a congestion due to venous stagnation, during contraction and relaxation of the uterus. Where asphyxia is great, petechial hemorrhage may occur. Major injuries are somewhat rare, and when occurring involve the spleen, liver, suprarenals, and intestines.

Suprarenal hemorrhage of the newborn occurs as a result of birth trauma, rough handling during resuscitation, and undoubtedly, in some instances, as a result of hemorrhagic disease. The main symptoms upon which one may base a diagnosis are rapid respiration and high temperature in the presence of normal lung findings. Other symptoms may be present, such as convulsions, petechiae on skin or mucous membranes, jaundice and abdominal symptoms. Injury of a slight nature may not cause a rise in temperature. The finding of a mass, unilateral or bilateral, is confirmatory evidence. Complete destruction of both glands may result in collapse, a subnormal temperature and sudden death. A low blood sugar, the result of medullary involvement, may aid in making a diagnosis. Recovery can take place where unilateral hemorrhage has occurred or where the injury to the glands is not too severe.

Reports of peritonitis following perforation of the intestine in newborn infants are not infrequent in medical literature. Some cases are even listed in which the injury has occurred during intrauterine life. Rupture, however, ordinarily takes place during delivery. The usual site of rupture is the colon and most frequently the sigmoid portion, due evidently to its long mesentery. However, rupture has been reported to occur in the stomach, duodenum and small bowel. As to the etiology being usually due to abnormal intestinal membrane angulations, peritoneal pockets and other abnormalities of the gastro-intestinal tract, autopsy has revealed only one-third of the cases presenting such abnormalities. Rupture of a normal bowel, as a result of trauma during passage through the birth canal, is not generally accepted. Rapid distention of the abdomen is the most early finding, plus other symptoms of a general peritonitis later. Prognosis is uniformly bad, treatment is limited to surgical repair, and measures to combat infection.

Injury to the mouth may occur as the result of the application of forceps. The rectum may also be injured in breech presentation when it is mistaken for an undilated cervix. In rare instances there is dilatation of the hemorrhoidal veins at the time of birth, and simulate the hemorrhoids of later life.

Rupture of the liver and spleen have been noted and occur most often with breech deliveries.

Lesions of the spinal cord are largely the result of trauma occurring during breech extractions and are nearly always severe. Complete severance of the cord may occur and these children are born dead. Death occurs early in those that survive because of a paralysis of the urinary bladder and the resultant infection. Paralysis involves the lower extremities and frequently the

muscles higher up in the trunk, depending on whether the lesion is low or high up in the cord.

From the standpoint of death rate, physical, and mental crippling in later life, intracranial injuries at this period of life are the most important of the entire group of injuries to the newborn. Diagnosis of this condition in many instances is not so readily made as one might be led to believe.

Symptoms which are of the greatest significance are those which indicate involvement of the nervous system. Convulsions, of course, are the outstanding example of such involvement and may be general or local. They usually start out as twitchings and become worse as more and more muscles are involved, finally becoming generalized into a convulsive seizure. The convulsion may be either tonic, clonic, or both. All convulsions occurring at this age are not the result of intracranial injury, but may also result from meningeal irritations or even edema. Somnolence may be a symptom, but can only be interpreted as such if it becomes deeper and finally results in coma.

The physical findings are of more significance than just the symptoms. In severe cases of injury, the children show a peculiar pallor which is often associated with cyanosis, most frequently noted in the lips. As the condition becomes worse, the cyanosis becomes more generalized.

Newborn children do not perspire under normal conditions, so that the presence of perspiration, which is rarely seen, is considered to be evidence of cortical involvement. The skin more often is cold and clammy; or, in the presence of fever, hot and dry. The heart rate is rapid at first, but if hemorrhage continues with increased intracranial pressure, it becomes slowed. The respirations are usually altered and follow the heart. Examination of the nervous system reveals few and inconclusive findings. Rigidity is found where there has been a large hemorrhage at the base of the brain with flow into the spinal canal. Rigidity at this age is hard to interpret unless it is very marked because the muscles are less pliable at this age than during later months, and, even then, with a child working against one, difficult to evaluate. Stiffness, which is of the greatest significance, is that which involves the muscles of the back, often producing a certain amount of opisthotonos. Flaccidity, when it occurs, is taken to be a bad sign.

A tense fontanelle is important, but a bulging fontanelle is of still more significance; however, it rarely occurs in intracranial hemorrhage. Eye symptoms frequently occur, and evidence of dilatation and contractions of the pupils and deviations similar to strabismus are present in severe cases. Examination of the eye grounds reveals little if anything of diagnostic importance.

As a diagnostic procedure, spinal puncture, or, better still, cisternal puncture with proper interpretation of the findings, is of definite value. In cisternal punctures, one is less likely to injure or puncture a vessel, thereby drawing blood. The presence of blood in the spinal canal fluid should not lead one to immediately conclude that

it is from an intracranial hemorrhage, because more than likely it will be there as a result of faulty technique in doing a spinal tap. However, if the blood is mixed with large amounts of spinal fluid and the individual cells are macerated or disintegrated, one may conclude that one is dealing with an intracranial hemorrhage, providing that no previous attempts at puncture have been made. The finding of a xanthochromatic fluid in a non-icteric child, four or five days after birth, is strong evidence for believing such a hemorrhage has taken place. Centrifuging of the spinal fluid, where there is presence of an intracranial hemorrhage will nearly always show some discoloration of the spinal fluid, and the cells will always show some disintegration. When the fluid is clear and the cells show no evidence of disintegration, one can be sure that one's technique in doing the puncture was at fault.

Increase in spinal fluid pressure is to be found in nearly all cases of intracranial hemorrhage.

As to treatment, little can be done, after the hemorrhage has taken place. Rest and absolute quiet are of first importance. Manipulation at this time will often cause further hemorrhage with disastrous results. The use of substances to increase the coagulability of the blood are indicated because of the lessened ability of

the blood to do so during the first days of life. The injection of whole blood intramuscularly is recommended, and its efficaciousness declared by some but denied by others. Whether the newer blood coagulants, vitamin K, etc., will be of much benefit is yet to be seen.

Relief of pressure may be attempted by means of the various punctures, lumbar, ventricular, and cisterna, but keeping in mind that the removal of the pressure may bring about further hemorrhage.

Where convulsions occur sedatives are used: chloral hydrate, phenobarbital and ether, or chloroform, if the convulsions are severe. Morphine, when carefully used, may be resorted to, in doses of 1/100 or even 1/200 of a grain hypodermically.

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The Use of Elimination Diets in Allergy of Childhood*

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WHEN symptoms of probable food allergy are not controlled by diets which exclude foods to which skin reactions have occurred, elimination diets should be used to determine clinical allergy. Less than 50 per cent of the patients that are allergic to certain foods give positive skin reactions to those foods. The best way to control food allergy is by eliminating the offending food or foods from the diet.

In planning an elimination diet consider the following:

1. Eliminate the foods to which a patient gives positive skin reactions or a positive history.
2. Diet should contain foods to which patients are infrequently sensitive as determined on the basis of skin reactions and histories of food dislikes and disagreements checked by diet trial. The leading causes of allergy according to this list,

in the order given, are wheat, eggs, milk, chocolate, tomatoes and potatoes.

3. Include as few foods as possible and yet prepare balanced meals with sufficient caloric intake and the maintenance of carbohydrate, protein, mineral and vitamins. These requirements will differ according to age. A child's diet will have to contain larger quantities of protein, vitamins, and minerals due to the growth factor.

A single sensitization to a food may occur, but usually sensitizations to many allergens of the same type and occasionally of various types exists. Practically all proteins are allergenic. One outstanding exception is gelatin.

Many times in children there is a correlation between dislikes in food and actual allergy. Such dislikes are at times the result of past experience that the foods produce disagreeable symptoms. Therefore, this must be

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taken into consideration when planning an elimination diet.

Each basic elimination diet should include:

1. One or two carbohydrates.
2. One or two protein foods.
3. Two or three vegetables.
4. One or two fruits.
5. Some oil and sugar.

The carbohydrates commonly included are rice, corn, rye, barley, tapioca, sage and sweet potato. Wheat allergy is more frequently encountered than any other food allergy, probably due to the large amount of bread and other wheat products which are eaten by the American people. Next to wheat, oats, corn and rice have given the greatest number of reactions.

Some protein foods must be included. Egg holds second place to wheat as a cause of food allergy. Therefore, egg will be eliminated from the basic trial diet. As to meats and fish, pork probably produces allergic reactions more frequently than other meats and beef produces more allergy than lamb. In fact, lamb and chicken sensitization is infrequent. Sensitization to fish, especially shellfish, is more common than to meats. Crab, shrimp and lobster are the most potent allergens. White fish and salmon on the other hand can be added to some elimination diets.

Milk is a very common allergen and therefore would be eliminated in a basic allergy diet. Diets do not have to contain milk to meet the requirements of health as long as the deficiency is taken care of in another way. The carbohydrate, protein, and fat content of the diet is easily maintained without milk. The main deficiency will be found in the calcium and phosphorus content of the diet. Milk substitutes which have been offered for feeding the infant and child sometimes are very satisfactory. The following may be considered.

1. Cemac is a liquid preparation made by Mead, Johnson and Co. It contains beef, cauliflower, tomatoes, carrots, spinach, dextrin-maltose, olive oil, gelatin, dicalcium phosphate and sodium acid phosphate. The large number of ingredients prevents the use of this preparation in all cases of milk allergy when other sensitivities exist.
2. Sobee is also prepared by Mead, Johnson and Co. It consists of soybean flour, olive oil, arrowroot starch, dextrin-maltose, sodium chloride, and dicalcium acid phosphate.
3. Mull-Soy is offered by the Muller Laboratories of Baltimore. It contains soybean flour, soybean oil, dextrose, sucrose, calcium phosphate, calcium carbonate, sodium chloride, vitamins A and D concentrated from fish liver oil. It is a liquid preparation which is well tolerated by infants and young children.

Vegetables make up an important part of the elimination diet. Allergy to specific vegetables exists and reactions to various vegetables are not infrequent. Cabbage, cauliflower, the legumes, white potato, celery and tomato cause allergy most frequently. Carrots, squash and lettuce produce little allergy.

Fruits are frequent causes of allergic disturbances. Usually specific allergies exist to individual fruits, although closely related ones produce trouble in certain children, such as all citrus fruits and all pit fruits. As a general rule, fresh fruit will cause symptoms much more frequently than cooked or canned fruit. Therefore all fruits on a trial diet should be cooked with the possible exception of the citrus fruits. Oranges, grapefruit, apples, bananas and strawberries probably produce the most allergy. Melons and other berries come next. Peaches and apricots rarely cause allergy.

Honey frequently produces allergic gastro-intestinal disturbances. A few cases of allergy to cane sugar have been reported, but most children tolerate beet sugar. There is little or no evidence of allergy due to syrup or dextrin-maltose. Allergic disorders from the ingestion of tapioca and sage, which are carbohydrates derived from roots, are very rare. As to the oils, olive oil may produce symptoms at times but usually it is a good oil to use in an elimination diet. Exclusion of cottonseed and corn oil from the diet has been necessary in some cases in spite of recent reports that these oils are not allergens.

Nuts give a rather marked allergic reaction, the most common offenders being peanut, almond, brazil nut and coconut. They are not included in trial diets.

Spices and condiments include pepper, to which many individuals are sensitive. Paprika, green, red or black pepper all act alike. Mustard has caused allergic reactions in children. Cinnamon, sage, dill and vanilla have also been reported. Spices are not permitted in an elimination diet until effects are determined after symptoms are under control.

Beverages exclude chocolate because of frequent sensitization to it. Coffee and tea may cause allergic reactions. All soft drinks should be eliminated until one is absolutely sure of their contents.

Table I indicates clearly the foods which should and should not be used in setting up a basic elimination diet while table II reveals the source of various minerals and vitamins in the ordinary unrestricted American diet. However, in the elimination diet non-allergic substitutes must be used to supply the deficiencies which exist. These substitutes are listed in table II.

For the sake of clearness and for economy of space sample diets for a child seven years old are presented as follows.

Foods included in the diet:

- Cereals—rye and corn.
- Meats—lamb and bacon.
- Vegetables—asparagus and beets.
- Fruits—apricots and pineapple.
- Fats—olive oil, corn oil, and the fat from the meats.

In addition, there are the foods allowed on any allergic diet. They are tapioca, sage, unflavored gelatin, baking soda, cream of tartar, egg free baking powder, refined and brown sugar, molasses, syrup, salt, white vinegar.

Two sample menus can easily be prepared from the foods listed.

TABLE I.
STRONG AND WEAK FOOD ALLERGENS IN CHILDREN

Cereals (carbohydrate)	Meats and Fish (protein)	Vegetables	Fruit	Miscellaneous	
Foods which often produce allergic manifestations					
wheat oats rice cottonseed flour	egg milk pork beef crab shrimp lobster	cabbage cauliflower legumes white potato celery tomato	orange grapefruit apple banana strawberries melons other berries	honey cottonseed oil chocolate tea coffee	pepper cinnamon sage dill vanilla peanuts almond Brazil nut coconut
Foods which seldom cause allergic symptoms					
corn barley rye soybean flour Lima bean flour arrowroot starch	gelatin lamb chicken white fish salmon	carrot squash lettuce asparagus beet spinach	peaches apricot plum prune	refined sugar brown sugar dextri-maltose syrup molasses	tapioca sago olive oil corn oil

TABLE II.
MINERAL AND VITAMIN CHART

Calcium	Phosphorus	Iron	Vitamin A	Vitamin B	Vitamin C	Vitamin D
Good sources in an unrestricted diet						
milk milk products egg yolk asparagus beans cauliflower	milk eggs cereal (whole grain)	meat egg yolk whole grain cereals asparagus beans cauliflower celery lettuce spinach apricots dates raisins	egg milk milk products fish carrots spinach asparagus cabbage celery lettuce apricots bananas	whole grain cereals milk meat asparagus peas spinach apricots apples	citrus fruits vegetables	fish oils irradiated foods butter cream egg yolk
Preparations available for an elimination diet						
Calcium lactate or gluconate Effervescent cal- cium gluconate One to two tea- spoonfuls three times a day	Dicalcium phosphate D. C. P. wafers Dulcet-bar (7 segments) One to three wafers or bars per day	Ferric ammonium citrate Iron pyrophos- phate (Cofron Tablets) One to two tablets per day	Carotene (pro- vitamin A) in cottonseed oil 5 to 10 drops each day	White's Vitamin B Complex (liquid) 5 to 10 drops before each meal White's Vitamin B Concentrated Tablets Kapsel Combex One or two tablets with each meal	Cevitamic (ascorbic) Acid 25 mgm. Tablets One tablet 2 or 3 times a day	Viosterol in Oil— Irradiated or A. R. P. I.* Process Drisdol White's Cod Liver Oil Concentrate Percomorphum Oil (50%) Standard Doses

*Ergosterol activated by action of low speed electrons.

DIET I.

Breakfast:

Pineapple juice—1 cup.
Cream of rye— $\frac{2}{3}$ cup with one tablespoonful of syrup.
Bacon—3 slices.
Corn bread—1 slice.
Apricot jam—2 teaspoonfuls.

Lunch:

Lamb chops—2 small ones.
Asparagus—3 ounces (by weight).
Ry-krisp—one piece.
Pineapple salad—1 slice with 2 tablespoonfuls of French dressing, made with corn oil and white vinegar.
Apricot tapioca— $\frac{1}{2}$ cup, made with apricot juice and sugar.

Dinner:

Lamb patties—3 ounces (by weight).
Beets—3 ounces (by weight).
Asparagus salad—3 ounces with 1 tablespoonful of French dressing.
Corn bread—1 slice.
Cornstarch pudding made with 1 slice of pineapple, sugar, and pineapple juice.
Apricot juice—1 cup.

DIET II.

Breakfast:

Apricot sauce— $\frac{1}{3}$ cup.
Cornmeal cereal— $\frac{1}{3}$ cup with two tablespoonfuls of syrup.
Bacon—3 slices.
Rye (100 per cent) bread toast—1 slice.
Pineapple jam—1 tablespoonful.

Lunch:

Roast lamb—3 ounces (by weight).
Harvard beets—3 ounces (with cornstarch, sugar, and vinegar).
Ry-krisp—1 piece.
Asparagus salad—3 ounces (with the special French dressing).
Apricot cornstarch pudding (no egg or milk).
Pineapple juice—1 cup.

Dinner:

Lamb broth with 2 ounces of diced lamb and 1 ounce of asparagus.
Apricot salad—2 ounces with 2 tablespoonfuls of special French dressing.
Bacon cornmeal muffins (no egg or milk).
Pineapple gelatin made by flavoring gelatin with sugar and pineapple juice.

These diets yield the following caloric, mineral and vitamin values.

	DIET I	DIET II
Caloric intake	2075	1979
Carbohydrate	220 grams	222 grams
Protein	62 "	59 "
Fat	105 "	95 "
Calcium	0.165 grams	0.164 grams
Phosphorus	0.8126 "	0.524 "
Iron	0.0148 "	0.0083 "
Vitamins	Deficiency in all vitamins	

The growing child must have a sufficient number of calories, an adequate amount of protein, and plenty of the minerals and essential vitamins. On the basis of 30 calories per pound of body weight the diets offered in this communication yield enough calories for a seven year old boy of average weight and height. The protein intake is adequate since only one gram of protein is required for each pound of body weight. The absence of milk makes it often necessary to include a protein food in the basic trial diet three times a day.

The mineral and vitamin requirements for the child are approximately as follows. Active research in this field at the present time may lead to frequent changes in the figures.

- Calcium—one gram per day.
- Phosphorus—one gram per day.
- Iron—.015 gram per day.
- Vitamin A—4000 to 6000 International units.
- Vitamin B—200 to 500 International units.
- Vitamin C—1000 to 1500 International units.
- Vitamin D—625 International units.

The omission of milk, milk products and egg yolk causes the basic elimination diet to be deficient in calcium. Beans, cauliflower and asparagus can furnish calcium, but the latter vegetable is the only one used. Therefore, calcium gluconate or lactate are often added to the diet. A palatable form of calcium gluconate is that prepared by Flint, Eaton and Co. (Decatur, Illinois) and called Effervescent Calcium Gluconate. One to two teaspoonfuls may be placed in any fruit juice and given three times a day with each meal.

Phosphorus is also very low in the diet because of the absence of milk, eggs, and some cereals. To meet this deficiency, dicalcium phosphate is employed. Most popular with children are the D. C. P. wafers of Parke, Davis and Co. or the Dulcet-bars (5 segments) of Abbott Laboratories. The preparations can be obtained flavored with mint or chocolate. One to three wafers or bars are used each day.

Iron seems to be taken care of fairly well in the basic trial diets since it is found in the cereals, meats, vegetables and fruits. However, ferric ammonium citrate is ordered by some physicians. Iron pyrophosphate can be administered by employing the Cofron Tablets (soluble) of Abbott Laboratories. These tablets consist of soluble iron pyrophosphate and copper sulphate (U.S.P.). A tablet is dissolved in fruit juice and given once or twice a day.

As to the vitamins, first consideration must be given to vitamin A. Eliminating egg, milk, milk products,

fish, fish oils, and many of the vegetables reduces the vitamin A intake markedly. Carotene (pro-vitamin A) in cottonseed oil offered by the S.M.A. Corporation of Cleveland is a good source of vitamin A. The child requires 5 to 10 drops each day.

The best natural sources of vitamin B are the whole grain cereals. Other sources are milk, some meats, vegetables and fruits. Recently vitamin B has received much attention. It is now added to practically every elimination diet. Young children tolerate White's Vitamin B complex very well. It is a liquid containing vitamin B, riboflavin, and other B complex factors. Usually 5 to 10 drops are given before each meal. White's Vitamin B complex concentrate tablets can also be obtained. Kapseal Combex of Parke, Davis and Company may be employed. The kapseals containing the vitamin B complex may be offered to older children.

The exclusion of citrus fruits and many vegetables cuts down tremendously the vitamin C content of the basic trial diet. However, this vitamin can easily be added to the diet by simply using cevitamic (ascorbic) acid tablets. The majority of the pharmaceutical organizations market a 25 mgm. tablet which is given two or three times a day in water.

Finally, we are concerned with vitamin D. It is found mainly in fish oils. Until fish is added to the diet, fish oils should not be used. Therefore, viosterol has commonly been employed as a substitute for cod liver or halibut liver oil. Some physicians have used crystalline vitamin D in propylene glycol. This preparation is called Drisdol and it is offered by the Winthrop Chemical Company. If there is definite evidence that no sensitivity to fish exists, then the Percomorphum oil (50 per cent) of Mead, Johnson and Co. or the White's Cod Liver Oil Concentrates can be administered in the regular standard doses.

The trial or elimination diet must be taken for at least ten days or even longer. If relief does not occur, another trial diet must be used. Not the slightest amount of any food not listed must be taken. To insure this, the parents must be fully acquainted with the diet. This cannot be stressed too much. Complete coöperation is absolutely necessary. Due to the small number of foods offered, it is essential for the child to eat large amounts of each food to insure a sufficient caloric intake. If the body weight decreases, the specified sugars, starches and oils must be increased.

With the relief of symptoms longer than former periods of freedom, foods are added one at a time about every three or four days. The first foods provided are the fruits and vegetables, leaving of course those giving positive skin reactions until the very last. If the child reveals any allergic manifestation after the ingestion of any one of the new foods, it should be eliminated at once.

The next foods added are the meats and cereals. The last foods to be furnished are the common allergens such as wheat, milk and egg. These should be added very slowly.

The following order may be used in returning the various foods to the child's diet.

Fruits—peaches, pears, bananas, apples, melons, berries and citrus fruits.

Vegetables—lettuce, squash, carrots, celery, potato, tomato, cabbage, cauliflower, peas and beans.

Meats—chicken (broilers or roosters), veal, beef, pork.

Fish—salmon, white fish and shell fish.

Cereals—barley, rice and oats.

Common allergens—wheat, milk and egg.

There are many chances for error in preparing the trial or elimination diets. Much has been written concerning the pitfalls in connection with these diets. Nevertheless, repetition at this time is still warranted since the various warnings cannot be emphasized too much. Always recognize the following suggestions as being very important.

1. Wheat elimination indicates the avoidance of commercial rye bread (made with wheat flour), pancake and cake flours, Pabulum, grape nuts, Pep (cereal), canned corn (containing wheat flour), macaroni, spaghetti, noodles, crackers, sausages, gravies and any foods coming in contact with white sauces or gravies, many cooked salad dressings, malted milk, and Postum (made of wheat moistened with molasses).

2. Wheat substitutes are Ry-krisp, rye bread made with 100 per cent rye flour, muffins of rye, corn or oatmeal, pancakes using rice flour, cereals such as cream of rye, corn flakes, rice krispies, puffed rice, oatmeal, rice flour used to dredge meats, cornstarch, tapioca, or rice to thicken gravies, white sauce made with cornstarch, and cornstarch to thicken custards and vegetables.

3. Many parents do not wish to remove all milk products from the diet. This is, however, very essential in cases with marked milk sensitivity. Milk elimination requires the removal of milk products (cream, butter, cheese), bread, cakes, cookies, pastries, macaroni, some kinds of spaghetti, mashed potatoes, canned vegetables, soups, margarines (churned in milk), custards, puddings, ice cream, sherbets, candies, milk chocolate, malted milk and Ovaltine.

4. There are a few substitutes for milk. The less sensitive children may be able to tolerate unsweetened evaporated milk or the dry (powdered) milks. Goat milk is highly recommended by some physicians. Individuals very sensitive to the casein of milk cannot receive any form of milk. We have used in the infants and smaller children the soybean preparations. They are fairly good substitutes.

5. Butter is omitted when the child is very sensitive to milk. In its place salted Crisco, bacon or chicken fat, or salted yellow vaseline have been employed. The removal of butter lowers the vitamin A content of diet, and this vitamin must be returned to the diet in some other form.

6. Eggs and foods containing eggs are often not completely removed from a trial or elimination diet unless special precautions are taken. Omit from the diet breads,

cake, cookies, brushed or glazed rolls and bread, macaroni, spaghetti, noodles (a few brands contain egg and therefore inspect labels), preserved meats, sausage, chicken (in the hen the unlaidd egg may have broken), salad dressings, ice cream, sherbets, candies (especially the soft filled kinds), marshmallows, Rumfords and Calumet baking powder, Ovaltine, Cocomalt, soups and coffee cleared with egg.

7. There are fairly good substitutes for egg. Muffins can be made using Royal or K. C. baking powders which contain no egg, one teaspoonful of the baking powder being used for each egg in the recipe. Fruit pulp may also be added to the muffins. Cornstarch may be used in the preparation of cooked salad dressings and puddings, one tablespoonful of cornstarch taking the place of one egg. French dressing is substituted for mayonnaise. Gelatin takes the place of egg in ice cream.

8. Vegetables may occasionally lead to trouble in the basic elimination diet. Emphasis may be placed on the fact that tomatoes are included in sauces, catsup, dressings, flavorings, soups and meat sauces. Onion and garlic are in meat sauces, flavorings and soups. Celery salt is often used in cooking, in bouillon cubes, and in soft drinks.

9. Fruits may enter the trial diet without the patient's knowledge. Apple sensitive individuals must not use cider vinegar but instead white vinegar which is made from acetic acid. Jello contains pure fruit juice and therefore desserts should be made with gelatin and flavored only with the fruit permitted in the diet. Certain candies, cookies and cakes will contain fruits.

10. Children are often very sensitive to nuts which are found in cereal drinks, pastes, candies, flours, ice creams. Coconut is found in candies, cake pastries, in margarine and lard. Peanut oil is used to dilute olive oil.

11. Every effort is being made to prove that certain oils are not allergens. However, reports by careful observers continue to appear indicating that markedly sensitive individuals may react to an oil. Cottonseed sensitive children can be sensitive to poor grades of cottonseed oil which is used extensively in cooking and in manufactured substitutes for lard such as Crisco, Spry, Cottonlene, Snowdrift, Wesson oil, and Primrose oil. Olive oil is often adulterated with cottonseed oil. The oil is used in frostings, candies and cookies. It is also employed in nut pastes and in blanching nuts. Sardines, salmon, tunafish and sturgeon are often packed in cottonseed oil.

12. Finally, note must be made of the fact that the dishes and pans used for preparing the basic elimination diet should be washed very carefully. A small particle of the offending substance may cause a reaction. Restaurant food often contains slight amounts of forbidden foods, due at times to poorly cleansed cooking utensils or carelessness in cooking. Menus for patients eating in a restaurant must be very simple. The allergic child on a trial diet will do best when all of the meals are prepared and served in his own home with strict adherence to the orders of the family physician.

Human Serum and Specific Agents in the Treatment of the Acute Meningitides*

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IT has been shown that the addition of fresh human serum to antimeningococcus serum increases the bactericidal power and opsonic activity of that antiserum. Bunim and Wies¹ reported a case of meningococcus meningitis in which fresh human serum had been used in combination with the regular antimeningococcus serum. The antiserum therapy was followed by a clinical improvement but the cultures from the spinal fluid did not become sterile. After 28 consecutive positive cultures, fresh normal human serum was administered intraspinally followed by additional antiserum, with immediate sterilization of the fluid. The authors came to the conclusion that when a case is resistant to an antiserum that agglutinates the recovered organism satisfactorily, the addition of fresh normal or convalescent human serum to the antiserum may be indicated. The exact proportions of the serum to the antiserum was not determined but it was suggested that 5 cc. of fresh human serum and 15 cc. of antimeningococcus serum is a satisfactory proportion. Fonde² reported two cases in which fresh human serum was used in combination with antiserum, with good results.

Buttle, Gray, and Stephenson³ in 1936 showed in their series of experiments on mice that the administration of sulfanilamide by mouth or intramuscularly protects the animals against fatal doses of meningococci. This work was confirmed by Proom.⁴ Branham and Rosenthal⁵ went further and showed that the protective value of sulfanilamide on mice against meningococci is equal to that of serum but that the best results were obtained when both were used in combination because an apparent synergistic action seemed to exist.

Schwentker⁶ in 1937 reported 52 cases of meningococcal infections treated exclusively with sulfanilamide with eight fatalities or a fatality rate of 15 per cent. Of 278 consecutive patients treated with antimeningococcus serum in the months immediately preceding the instigation of sulfanilamide therapy, the mortality rate was 30 per cent as compared with 15 per cent for the drug. The drug was administered both intraspinally and subcutaneously in a concentration of 0.8 per cent. To some patients it was given by mouth. Willien⁷ treated five cases and one recurrence with oral sulfanilamide with no fatality. He concluded that the response to treatment was satisfactory even with oral therapy alone. Both the above workers showed that the spinal fluid became negative within 24 hours in the majority of instances. Recently Eldahl⁸ treated 12 cases of meningococcal meningitis in children under 4 years of

age with intrathecal and intramuscular injections of 0.8 per cent sulfanilamide solution with three fatalities (25 per cent), whereas formerly the mortality in this age group averaged 70 per cent. He concluded that "sulfanilamide treatment . . . has but little effect if the remedy is administered exclusively by mouth or intramuscularly. But if it is given intrathecally along with the other administrations, then the treatment is very valuable. This is probably because the elimination of the sulfanilamide through the meninges may be very slow and very slight when they are inflamed. It is not likely that intrathecal injections alone are sufficient, because the meningococci can be found outside the spinal canal, and on these the sulfanilamide when given by mouth or intramuscularly, can have considerable effect."

Allott⁹ using Marshall's original method¹⁰ determined the sulfanilamide content of the cerebrospinal fluid during treatment of 36 cases of meningococcus meningitis and found that in many cases the concentration takes several days to reach a maximum, the dosage being kept constant. He found considerable variation in the speed with which the effective level is reached and maintained on equivalent dosage. He surmised that this variation is due more to differences in the ratio of excretion rather than to a variation in meningeal permeability as the blood sulfanilamide level also showed similar variations.

The latest report is by Waghelstein¹¹ who reported 72 cases treated with sulfanilamide alone with a mortality of 15 per cent, 34 cases treated with sulfanilamide and serum with a mortality of 24 per cent, or a total of 105 cases treated with sulfanilamide either alone or in combination with serum with a mortality of 18 per cent. Of 368 cases treated with antiserum prior to sulfanilamide, the mortality averaged 27 per cent. The number of lumbar punctures performed was markedly reduced so at present the author performs only two taps. He found that complications due to sulfanilamide were mild and few and the number of recurrences were reduced. The complications due to meningococcal infections, however, were not reduced in occurrence. He also found that the spinal fluid cultures were more consistently sterile after 12 to 24 hours of treatment in those cases in which sulfanilamide was taken every four hours by mouth or by naso-gastric catheter rather than when given every 12 hours by hyperdermoclysis.

Marshall and his co-workers¹² showed that the sulfanilamide level in the spinal fluid is almost on the same level as that of the blood, showing that the drug readily passes through normal or pathologic meninges. The

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observations of Eldahl¹⁰ and Allott¹¹ does not coincide with the results obtained with the drug by American workers. This may be due to the fact that technical difficulties were encountered by using Marshall's original method of sulfanilamide determination. In our experience Marshall's original method gave low sulfanilamide levels both in the blood and in the spinal fluid. By using Marshall and Litchfield's¹⁴ modified method much better results were obtained, the sulfanilamide level being on an average 10 per cent lower, than that in the blood. The absorption was good whether the drug was administered orally, subcutaneously, or intramuscularly.

Our experience to date totals 13 cases treated with sulfanilamide alone and 7 cases treated with sulfanilamide in combination with massive doses of antitoxin intravenously. We have had no deaths in these 20 cases. We have found that intraspinal administration was not necessary. Waghelstein's¹³ recommendation of administration by stomach tube has been found to be successful in infants, but in older children and adults due to the frequency of vomiting which accompanies the disease it has been found to be unsatisfactory. In the latter case, the drug was administered by hypodermoclysis in the form of 1 per cent solution in Hartman's solution every eight hours during the critical stage of the disease and in those patients who cannot tolerate the drug by mouth. In all other instances, the oral route of administration has been satisfactory. In adults we have given an initial dose of $\frac{1}{2}$ grain per pound of body weight followed by a maintenance dose of $\frac{3}{4}$ grain per pound of body weight daily in divided doses. In infants and children, who generally tolerate the drug better, we have given an initial dose of 1 grain per pound of body weight followed by a maintenance dose of 1 grain per pound of body weight daily in divided doses.

Seven cases were treated with sulfanilamide in combination with massive doses of antitoxin intravenously—100,000 to 200,000 units. The results were more striking and immediate with prompt subsidence of toxic symptoms and fall of temperature with crisis. The remarkable rapidity in which the spinal fluid was sterilized was noted. In no instance was a positive culture obtained after 24 hours of sulfanilamide therapy. This cannot be said of either antiserum or antitoxin.

Waghelstein reported that complications associated with meningococcal infections occurred just as frequently as in cases in which antiserum was used. In 368 cases treated with antiserum, arthritis developed in 10, endophthalmitis in 2, and deafness in 6. In 106 cases treated with sulfanilamide, arthritis developed in 5, endophthalmitis in 1, and deafness in 5. This as well as our observations, indicates that sulfanilamide does not combat toxemia directly and that the attack must be on the organism. As Ferry has pointed out, the toxins give the characteristic symptoms of the disease as well as the permanent defects. It is reasonable to conclude, therefore, that the ideal therapy would be a combination of large doses of antitoxin intravenously to combat the toxemia together with continued administration of large

doses of sulfanilamide orally or subcutaneously to destroy the organisms.

OUTLINE OF TREATMENT FOR MENINGOCOCCIC MENINGITIS

1. Spinal puncture for diagnosis. Enough fluid is withdrawn for laboratory study. The fluid is analyzed for cell count and differential, organisms by smear and culture, protein, sugar, and Wassermann.

2. If the fluid is cloudy, sulfanilamide is administered immediately subcutaneously in the form of 1 per cent solution in normal saline or Hartman's solution in dosages previously suggested. The drug is then administered orally every four hours if tolerated by this route. If not, subcutaneous injections of the 1 per cent solution are given every eight hours. The dosage used has previously been mentioned.

3. Antimeningococcus antitoxin is given in massive doses intravenously as early as possible. In children 50,000 units are given and in adults 100,000 units. This may be repeated the next day if favorable response is not obtained in 24 hours. The serum is placed in 200 to 500 cc. of 10 per cent dextrose solution in normal saline together with $\frac{1}{2}$ cc. of 1:1000 adrenalin solution and administered slowly at the rate of 30 to 60 drops per minute. Sensitivity of the patients to horse serum should be tested. The antitoxin is given after the causative organisms have been definitely identified. In allergic patients we do not recommend serum administration.

4. Spinal punctures are done only as indicated for drainage and to reduce intracranial pressure. Usually two or three taps are all that is necessary.

5. Since sulfanilamide therapy was started, cisterna drainage has not been found necessary.

6. The administration of general anesthesia for spinal punctures is conducive to bronchopneumonia which usually is fatal. The elimination of spinal taps to a minimum and elimination of intraspinal therapy is a great advantage.

7. Administration of parenteral fluids in comatose patients, and fluids and feedings by stomach tube in infants are highly desirable.

8. Special nursing care in turning the patients from side to side to prevent hypostatic pneumonia is emphasized. Restraints should be avoided if possible.

9. Morphine is avoided because of its respiratory depressing effect. Sedatives if given should be used to quiet the patient and not to the point of anesthesia.

10. Blood transfusions are indicated when the hemoglobin or white blood count is low.

FEVER THERAPY

Bennett, Person, and Simmons and Platou, MacElmeel, Stoesser and Cooke in 1936 showed for the first time experimentally as well as clinically that sustained artificial fever at 41.5 degrees C (106.8 F.) for eight hours destroys most strains of meningococci. Both groups of workers recommended hyperthermia in chronic or subacute cases that are resistant to serum therapy. They emphasize, however, that fever is contraindicated in the acute toxemic phase of the disease.

STREPTOCOCCUS MENINGITIS

Prior to the advent of sulfanilamide, many therapeutic measures were exploited for a possible cure of streptococcus meningitis. Some of these were based on sound physiological principles. Successful results in 61 proved cases of this disease reported up to 1935 and tabulated by Gray¹⁶ are attributed in some instances to one or another procedure. Repeated spinal drainage, surgical drainage (Dandy¹⁷), spinal-cisterna lavage with various solutions, intrathecal injections of antiseptics and sera, ethyl hydrocupreine hydrochloride (Kolmer¹⁸), intravenous injections of dyes, sera, and antiseptics, blood transfusions, etc., have all been tried with occasional recoveries. The multiplicity of methods employed, however, is perhaps an indication of the lack of specific effectiveness of any one or combination of procedures. The more critical authors agreed that early diagnosis, complete eradication of focal infections, and adequate drainage were most responsible in the success of any proposed treatment.

Since sulfanilamide was introduced in 1935³⁷ for the treatment of streptococcal infections, there have been innumerable reports of rapid recoveries. Neal²⁰ in a recent article reported that in hemolytic streptococcus meningitis using sulfanilamide in 27 cases, the mortality was reduced from over 95 per cent in previous years to approximately 20 per cent. Eley²¹ stated that during the ten year period prior to the use of sulfanilamide at the Infants' and Children's hospitals of Boston 92 cases of hemolytic streptococcus meningitis were treated by the usual methods with only one recovery. Since the use of sulfanilamide, six cases were treated with six recoveries. Silverthorne and Brown²² reported that from 1924 to 1936, 93 cases were treated at the Hospital for Sick Children in Toronto, Canada, with one recovery. During 1937, nine cases were treated with prontosil and sulfanilamide or both with continuous intravenous injections of glucose-saline, daily spinal punctures, and mastoidectomy when indicated, with five recoveries.

Smith and his co-workers²³ reported a recovery from an anaerobic beta hemolytic streptococci, meningitis of otitic origin treated with prontosil and sulfanilamide. Schwentker et al²⁴ reported that whereas no recoveries occurred in 37 cases treated at the Johns Hopkins Hospital in the last 15 years, three recoveries out of four occurred since the use of sulfanilamide. Schwentker²⁵ later reported 19 recoveries in 23 cases. Applebaum²⁶ reported 26 cases of otitic or sinus origin with 21 recoveries, whereas for 28 years prior to 1936, 274 cases were treated with only 15 recoveries. Retan,²⁷ Martin and Ellenberg,²⁸ Litvak and Klughertz,²⁹ Weinberg and associates,³⁰ Vitenson and Konstam,³¹ Woodman,³² Godwin,³³ Lewy,³⁴ Anderson,³⁵ Smith and Coon,³⁶ Love,³⁷ Cline,³⁸ and others reported favorable results with recoveries using sulfanilamide or its derivatives. The lowering of the mortality from about 97 per cent to less than 20 per cent shows the effectiveness of sulfanilamide in the treatment of this highly fatal disease.

At the Minneapolis General Hospital from 1922 to 1938, we have had 137 cases of streptococcus meningitis with only two recoveries. These two were treated with repeated drainage, saline irrigations, scarlet fever antitoxin, mastoidectomy, and repeated transfusions. Other methods of therapy, such as Kolmer's intracarotid injections of optochin, sera, etc., were tried without success. Since 1937, we have treated eight cases of streptococcus meningitis with sulfanilamide with eight recoveries.

The outline of treatment followed is similar to that described for pneumococcus meningitis, except that no sera are used. Spinal punctures were done only as indicated to decrease pressure and for drainage when the fluid was extremely cloudy. On an average, daily spinal punctures were done for four or five consecutive days. Early diagnosis, prompt and complete eradication of foci of infection, and early treatment are highly important to get the best results. Repeated observations at autopsies have revealed a hidden mastoid focus in patients with a previous history of otitis media but with no X-ray or clinical evidences of mastoiditis. Early treatment will prevent the formation of a localized meningitis. It has been our experience that sulfanilamide will not invade localized accumulations of pus, and therefore the drug will be ineffective when such a condition arises. Frequent transfusions have helped to improve the patients' general condition.

PNEUMOCOCCUS MENINGITIS

The treatment of pneumococcus meningitis has always been unsatisfactory. With the discovery of sulfanilamide and experimental observations that the drug is effective against the pneumococci, tremendous impetus has been given to the treatment of this condition. Clinical observation, however, does not seem to indicate that this drug is as effective against the pneumococci as against the streptococci or the meningococci. Mortality reports prior to sulfanilamide have averaged 99 per cent, so that any form of therapy seems worthwhile.

Neal and Applebaum³⁹ reported 100 per cent fatality prior to 1936. Finland and his associates⁴⁰ reported 96 cases from 1926 to 1936 all of which died. Shaffer, Enders and Wilson⁴¹ reported 74 cases from the Boston Children's Hospital with one recovery. Toone and Hegenbotham⁴² reviewed 31 recovered cases and found that the treatment varied but most patients received some chemical or immunological agent. Optochin recommended by Kolmer was the drug most frequently used. Fifteen of 31 cases received homologous antipneumococcus serum intravenously, intraspinaly, or by both routes. Daily lumbar drainage, cisterna drainage, genitival violet, Pregl's solution, mercurochrome, autogenous vaccines, urotropin orally, etc., have all been tried both here and elsewhere with very little success.

Branham and Rosenthal⁷ and Osgood⁴³ reported that *in vitro* experimentally sulfanilamide and serum are more effective against the pneumococci than either used alone. Since the use of sulfanilamide, there have been some reports of better results but these have not been as striking as with streptococcus or meningococcus meningitis. Applebaum²⁶ reported four cures and two possible cures

in 32 patients treated with the drug. Finland and his associates⁴⁰ from the Boston City Hospital reported six recoveries in ten cases using sulfanilamide in large doses in conjunction with specific complement and serum. Eley²¹ treated six cases with the usual doses of sulfanilamide with no recoveries.

Robertson⁴⁴ and Ward and Enders⁴⁵ stated that for the phagocytosis and destruction of pneumococci, it is necessary to have specific antibody, an adequate number of leucocytes, and complement in the spinal fluid.

Since the best result to date is that reported by Finland et al, it may be worthwhile to dwell upon his conclusions and to review his outline of treatment. These authors found that sulfanilamide inhibits the growth of pneumococci, may clear bacteremias of low grade, reduce the number of pneumococci in the spinal fluid, and occasionally may cure a case but the spinal fluid culture remains positive for organisms for many days.

When used in conjunction with serum, however, it completely cures many severe pneumococcal meningeal infections. Moreover, they have found that with rare exceptions, complement cannot be demonstrated in the spinal fluid, when complement is injected it disappears rapidly, no antibodies can be demonstrated in the spinal fluid, antibodies contained in specific sera given intravenously does not invade the spinal fluid, bacteremia is frequently present or develops during the course of the disease, large amounts of specific antibody introduced into the spinal canal may be harmful by the effect of the precipitate formed from the interaction of serum and antibody, by the agglutination of pneumococci, and by the deterrent effect of both of these factors on the action of the leucocytes present in the spinal fluid. He has, therefore, recommended an outline of treatment.

Reports from the literature indicate that Type 1 is most frequent in primary infections and Type 2 in cases secondary to otitic or sinus origin. The most frequent types in our series have been Types 1, 2, 3, 4, 5, 6, 7, and 8.

At the Minneapolis General Hospital from 1922 to 1936, we have had 85 cases of pneumococcus meningitis treated by various methods with no recoveries. In 1937-1938, we have treated four cases with type specific serum intravenously together with the usual dose of sulfanilamide with no recoveries. In 1938, we have treated two cases with three times the recommended dosage of sulfanilamide with one recovery. The other case that died showed at autopsy that the meninges and the surface of the brain were free from pus except for a localized abscess in the frontal area of the brain, and an extensive bronchopneumonia. We are quite sure that this patient would have recovered had it not been for his pneumonia. In both of these cases the sulfanilamide content of the spinal fluid ranged consistently between 20 to 32 mg. per 100 cc. The case that died was Type 3, and the recovered case belonged to a higher type because no reaction occurred with homologous sera Types 1 to 24.

Eley²¹ recently suggested that larger doses of sulfanilamide to produce a concentration of the drug in the spinal fluid of 25 to 35 mg. per cent may be more effective.

Early in 1938, the English drug house, May and Baker, announced that 2—(p-aminobenzenesulfonamide-pyridine) had been found to protect mice against invasion by pneumococci to a greater extent than sulfanilamide. This drug is marketed in Great Britain under the name M & B 693 or "Dagenan".⁴⁶ Using this drug, Reid and Dyke,⁴⁷ Robertson,⁴⁸ and Cunningham⁴⁹ reported recoveries from pneumococcus meningitis. Various English authors⁵⁰ have shown the superiority of sulfanilamide-pyridine in pneumococcal infections in man, thus confirming the claim of May and Baker. The exact mode of action of the drug against the pneumococcus is not known. Fleming⁵¹ stated that the drug "does not in vitro prevent the capsulation of pneumococci. A more likely mode of action is simple inhibition of growth (and possibly of toxin formation), and while the organism's growth is stopped and its vitality lowered, some agent in the body damages the capsule or perhaps some autolytic process occurs." Experiences with this drug in our hospital seem to indicate that it is most effective against the lower types of pneumococci, particularly Types 1 and 3 which are the most common causative agents for pneumococcus meningitis. Sulfanilamide-pyridine has not been used long enough to warrant any conclusions being drawn, but it offers a hopeful outlook for this highly fatal disease.

OUTLINE OF TREATMENT FOR PNEUMOCOCCUS MENINGITIS

1. Complete drainage of spinal fluid and use for culture and type identification.
2. Large doses of sulfapyridine.
3. Give homologous type specific horse or rabbit serum intravenously.
4. One to two hours after serum has been administered, 15 cc. of the patient's venous blood are withdrawn and the serum separated. Another lumbar puncture is done and this fresh serum is given intraspinally.
5. In infants and small children or where frequent venepunctures are not desirable, fresh human serum obtained from any suitable donor is collected and used together with 0.5 to 1 cc. of type specific serum for intraspinal injections. Thereafter, lumbar punctures are done three or four times daily or as indicated.
6. Fresh human serum and specific serum administration intraspinally may be repeated several times depending on the findings in the spinal fluid.
7. Frequent transfusions of blood.
8. Eradication of foci of infection.

INFLUENZAL MENINGITIS INCIDENCE

Influenzal meningitis is essentially a disease of infancy and early childhood. Taking all ages into consideration, Neal⁵² ranks it fourth among the purulent meningitis. However, among 184 children under 2 years of age admitted to the Children's Hospital of Boston with purulent meningitis from 1926 to 1931, Ward and Fothergill⁵⁴ reported that it ranked second only to

meningococcic meningitis in incidence. Neal in her series reported 84 per cent were under 5 years of age. Fothergill and Wright⁵⁴ found that 80 per cent were between the ages of 2 months to 2 years, and that there were no cases in infants below 2 months. This they attributed to a passive immunity derived from the mother. In our hospital, influenzal meningitis has been very rare. This may be due to difficulty in identifying the organisms due to marked pleomorphism and also the fact that the bacillus of influenza does not grow well on ordinary peptone media.

PROGNOSIS AND MORTALITY

Mortality has varied from 98 to 100 per cent. Prognosis is always poor whether specific serum is used or not. Recovery is more frequent in children over 2 years of age. Huntington and Wilkes-Weiss⁶² treated 39 cases without serum with two recoveries. They collected 500 cases from the literature and of 373 infants under 2 years, there were nine recoveries (97.6 per cent fatality) while 26 of 127 children over 2 years of age recovered (79.5 per cent fatality). Neal in 111 cases gave a fatality rate of 96.4 per cent. Rivers in 220 cases reported a fatality of 92 per cent. Bloom⁵⁵ in 1931 collected 302 cases with 92 per cent mortality.

TREATMENT

Wollstein⁵⁶ first developed serum in experimental work protecting monkeys with such serum. Ward and Wright,⁵⁷ and Ward and Fothergill⁵³ reported that complement was lacking in the spinal fluid of influenzal meningitis patients and recommended the addition of normal serum to anti-influenzal serum before injection. Pittman⁵⁸ in 1933 developed type specific antiserum and used it in 18 cases with one recovery. Ward and Fothergill stated that too much antiserum for the concentration of complement present nullified effective bacteriocidal action. They treated five patients with specific antiserum and complement. All died but they noted that the cerebrospinal fluid was sterilized for varying periods of time up to 14 days. Autopsy showed that the cause of death was localized abscesses shut off from the general subarachnoid space and so protected from the action of the complement and specific antiserum.

Fothergill⁶³ in 1937 reported 201 cases treated with antiserum and complement with 31 recoveries or a fatality of 84.6 per cent. He believes that the organisms enter the body via the respiratory tract, then invade the blood stream, and finally localize in the meninges. He has outlined the following method of treatment:

1. Specific serum is given intravenously once daily for two days, 30 cc. for infants and 30 to 50 cc. for older children. This is done to overcome bacteremia.
2. Mixture of antiserum and complement (fresh human serum) is given intrathecally twice daily for as long as indicated. The proportions recommended were 15 cc. of antiserum and 8 cc. of complement.
3. The spinal fluid is completely drained.

4. Since many patients receiving this treatment show evidences of temporary improvement followed by rapid fatal relapse, treatment should be continued longer than one imagines would be necessary.
5. Since in cases that died following a relapse, the cause of death was due to localized abscesses, early treatment aimed toward prevention of the formation of these abscesses seems important.

Eley²¹ reported in 1938 that at the Infants' and Children's Hospitals of Boston, 96 cases of influenzal meningitis were treated with specific serum with six recoveries. Six cases were treated with specific serum combined with sulfanilamide with no recoveries. One case was treated with sulfanilamide in amounts sufficient for a concentration in the spinal fluid of 25 mg. per cent with recovery. He, therefore, suggested that a higher dosage may bring better results.

At the Minneapolis General Hospital from 1922 to 1938, we have had 17 cases of proven influenzal meningitis treated by various methods with no recoveries. From a review of the literature, it is reasonable to expect the best results would be obtained by a combination of specific antiserum together with large doses of sulfanilamide.

STAPHYLOCOCCIC MENINGITIS

Occasional recoveries from staphylococcus meningitis have been reported, but the mortality from this disease has been practically 100 per cent. Since most of our cases have developed in the course of a generalized septicemia, we have had no recoveries in 15 cases treated from 1922 to 1938. Repeated blood transfusion, vaccines, sera, antiseptics, chemicals, etc., have all been tried with futile results. Fenton and Hodgkiss,⁵⁹ Maxwell,⁶⁰ and O'Brien and McCarthy⁶¹ recently reported recoveries from staphylococcus septicemia following the use of sulfapyridine.

SUMMARY AND CONCLUSIONS

1. An analysis of the cases and treatment of meningococcic, streptococcic, pneumococcic, staphylococcic, and influenzal meningitis at the Minneapolis General Hospital during the period 1922 to 1938 are given.

2. Meningococcic, streptococcic, and pneumococcic meningitis were encountered most commonly in the order given, while influenzal meningitis has been infrequently diagnosed, probably because of the difficulty in isolating and identifying the Pfeiffer Bacillus.

3. Approximately 50 per cent of cases of secondary meningitis were of otitic origin.

4. All forms of meningitis are more common in the male.

5. The case fatality rate from meningococcus meningitis in Minnesota has ranged from 40 to 45 per cent.

6. The use of meningococcus antitoxin did not cause a lowering of the fatality rate as compared to antiserum.

7. Sulfanilamide used alone in 13 cases of meningococcus meningitis has been highly successful with no fatalities. The rapidity in which the spinal fluid was sterilized has been noted. In no instance were organisms

recovered on cultures after 24 hours of treatment with the drug.

8. Sulfanilamide does not combat toxemia. Once the exotoxin unites with tissue, drugs or sera will probably not neutralize it. This is evidenced by the fact that although the mortality has been lowered by the use of the drug, the incidence of complications and sequelae has not been affected.

9. Experimental and clinical evidence suggests that sulfanilamide acts synergistically with specific serum. In seven cases of meningococcus meningitis receiving the combined therapy of sulfanilamide and antitoxin, toxemia rapidly subsided and spinal fluid cultures became sterile within 24 hours. It seems, therefore, that the ideal therapy would be early administration of massive doses of antitoxin intravenously combined with continued large doses of sulfanilamide.

10. Since the use of sulfanilamide, spinal punctures for meningococcus meningitis have been reduced to two or three, and cisterna puncture has not been necessary.

11. Narcotics should be avoided in all forms of meningitis because of the respiratory depressive effect.

12. Blood transfusion is a valuable adjunct in the therapy of meningitis.

13. From 1922 to 1937, 137 cases of streptococcus meningitis have been treated by various methods with only two recoveries, a fatality of 98.5 per cent. With sulfanilamide, we have had eight recoveries in eight cases.

14. During the same interval, 85 cases of pneumococcus meningitis were treated with 100 per cent mortality. Since 1938, four cases were treated with type specific sera intravenously plus sulfanilamide in the usual dosage with no recoveries. Two cases were treated with massive doses sufficient to raise the spinal fluid sulfanilamide level to 25-35 mg. per cent, with one recovery.

15. Sulfanilamide is not effective in localized accumulations of pus. Therefore, early and complete eradication of foci in secondary meningitis is important.

16. Intravenous or intrathecal administration of type specific sera in pneumococcus meningitis has not been effective. Lack of complement and antibody in the spinal fluid has been demonstrated. Therefore, the addition of these substances into the spinal fluid as recommended by Finland and associates may be a valuable procedure.

17. Sulfapyridine has been responsible for a few cures in pneumococcal meningitis.

18. Seventeen cases of influenza meningitis have been treated by various methods with no recoveries. Usual doses of sulfanilamide have not been effective. Eley's recommendation of massive doses of sulfanilamide to raise the spinal fluid concentration to 25 mg. per cent of the drug is worthy of consideration.

19. The treatment of staphylococcus meningitis has not been satisfactory. Recent reports in the English literature seem to indicate that sulfanilamide-pyridine may be effective in the treatment of staphylococcus septicemia and meningitis.

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MATERNAL CARE

It has been estimated that from one-half to two-thirds of the maternal deaths which occur each year in this country are preventable. This conclusion has been reached after careful study of records of many thousands of maternal deaths. As a result of these studies, most state medical societies have formed committees to study the maternal care problems within their own state. This plan is an important factor in the reduction of our maternal mortality rate. Dr. Moore has presented maternal mortality figures for North Dakota in this issue. The Maternal and Child Welfare Committee of the North Dakota State Medical Association, and Dr. Moore, as its Chairman, is to be congratulated on the fine results obtained in North Dakota. Their low maternal mortality rate for 1938 is a goal which could be set by all states. In comparable studies it is believed that many neonatal deaths are unnecessary. If we are to lower our maternal and infant mortality to an irreducible minimum, we must give our mothers and babies better care. This can be accomplished by a three-way

educational program. The public must be made aware of the importance of early and continuous maternal care. Local communities must work out a plan to furnish satisfactory care to the needy. The medical and nursing professions must assume responsibility for the development of such an educational plan. They must also see that facilities are available so that each patient may have adequate care during her pregnancy, labor and puerperium.

F. L. M.

WE LOOK AHEAD

Stirred finally from smug complacency, the medical profession of the United States has taken on new life. Whether we give credit to the politician of the Hoover regime or the New Deal, the Parent-Teachers' Association or the American Legion, the subdivision of the American Medical Association into specialties, public health departments or the social welfare groups, or all together opening new vistas, we must admit that our profession is finally again on the march in its attempt

to produce modern medicine—proved medicine—for all classes and conditions of people. Medical care is either a luxury or a necessity. It must either be allowed to drift along as some individual physician might want, or it must be kept up to date by all those practicing the profession. Feeling that medicine is a necessity and that there is a distinct need to provide the best for all, the present administration in Washington has put on a concerted drive through the Children's Bureau and the Public Health Department to encourage medical men through funds and suggested programs to do for their various localities what may be necessary in order to provide the best available care, particularly to mothers and children.

The very first of the practicing profession in North Dakota to see just what this awakening would mean to the profession and public alike was Doctor John Moore of Grand Forks. Four years ago he organized the obstetrical and gynecological men of the state and started a state-wide program of instruction by local qualified obstetrical men. Outside men of renown in this work were brought in and traveled the state. The profession was slow to grasp the idea. The state medical association, however, soon realized the importance of the program and appointed a Committee of Maternal and Child Health with Doctor Moore as chairman.

Eager to be leading and not following, Doctor Moore conceived the idea over a year ago of how to put on a drive to lower infant mortality in North Dakota. At the meeting of the Committee last fall in Grand Forks, he unfolded his plan. Doctor Maysil Williams, State Health Officer and Secretary of the Committee, readily agreed to assist in financing the plan through the government fund allotted to her department for this type of work. She also agreed to aid in organizing the meetings through her publicity department and state-wide nursing service. Let me acknowledge here that I am confident that such success as the program may have had should be credited to the North Dakota State Health Department for the thorough coöperation.

Prematures account for over 33 per cent of the infant deaths in North Dakota. Nation-wide statistics as compiled in Washington show 42 per cent of infant deaths accounted for by prematures. We realize that the infant mortality rate has been steadily improving nationally and in North Dakota according to figures compiled since 1914. The premature rate, however, has remained stationary. Every physician and nurse has always felt a definite hopelessness in caring for the premature. These facts make one realize the importance of tackling the premature mortality rate first. Survival was always very definitely dependent upon the constitution provided the newborn by the parent, and technique was hit or miss. This feeling existed even among pediatricians though each had a fondness for his own certain technique.

Last summer Doctor Moore had occasion to remain in Minneapolis several weeks, and while there, he became interested in Doctor Stoesser's work on prematures at Minneapolis General Hospital. In 1930 Doctor Stoesser took over the care of the prematures in that hospital.

Statistics showed 60 per cent mortality. In 1931, 65 per cent of the prematures died. From then on a definite decrease was shown in the mortality rate each year until in 1938 it was down to 17 per cent. Doctor Stoesser's figures, his improvements and combinations in care, his writings have brought due recognition and his technique will now be quoted in the Government Infant Care Manual as the accepted one. His enthusiasm and ready coöperation made the task of arranging the work for presentation comparatively simple for us. He provided the slides to use in the lantern during the lecture and provided the routine. This fall he will follow up personally in a trip over the state as visiting pediatrician for the postgraduate courses.

Through W.P.A. and the Carpenter Department, the University of North Dakota built "low cost incubators" with temperature and humidity control. These are available to any medical unit for \$53.00. The open market cost for the same incubator is \$170.00. So far, thirty such incubators have been distributed throughout the state, and the physicians using them have already been convinced of their value for full term as well as premature care.

In order to bring this Stoesser routine on premature care to the doctors and nurses of the state, seventeen towns scattered over the entire state were visited. Afternoon lectures were given to the nurses and evenings were spent going over the outlines with the physicians. The usual attendance of nurses was about thirty. The largest meeting was in Minot where there were 135 nurses present. The usual attendance of physicians was fourteen. The largest attendance was 53 at Bismarck and the lowest 7 at Fargo.

We, the members of the Committee on Maternal and Child Welfare, are confident all will coöperate more in planning new features to be brought to us in our own localities—as "we look ahead."

R. E. P.

MINNESOTA MEDICAL SCHOOL CELEBRATES GOLDEN ANNIVERSARY

This year marks the completion of the first half century of medical education by the State University in Minnesota. A program celebrating this event will be held on the University campus on October 12, 13 and 14, the details of which are published under "Future Meetings." A half century ago, the charters and properties of private medical schools in Minneapolis and St. Paul were formally turned over to the Board of Regents of the University of Minnesota, who thereupon assumed responsibility for the provision of adequate medical teaching for the State.

That obligation has been viewed seriously, and in the years that have intervened a scientific institution has been built, of which the early founders might well be proud. The ideals of those pioneers have been given expression in an enterprise which stands as one of the best of its kind in the world, whose success represents the most complete vindication of the wisdom of the leaders in Northwest medicine of that earlier day in placing upon the community at large the burden and

the privilege of supporting and determining the course of professional medical education.

Medical education is peculiarly a cooperative enterprise between persons devoting their whole time and energies to it, and those professional men and women who give generous portions of their service to it while carrying on the work of the profession in the community. The University of Minnesota Medical School would not be the type of institution it is today without the loyal and energetic support it has had from the medical profession of the community. Medicine is the application of science to an art, and the physicians who are practicing that art in the community are indispensable to the teaching of new generations of physicians.

But the relationship is reciprocal. The physicians of the State gain immeasurably by the presence of a nucleus of enthusiastic but critical teachers and investigators whose influence touches in numerous intangible but none the less real ways upon medical practice, raising its tone and keeping the profession as a whole alert. A State University is a service institution. It is established and supported to supply the needs of the State in providing higher education and its adjuncts. It is an institution for the dissemination, preservation and furtherance of knowledge. All of its activities are, and must be, aimed at those fundamental ends.

The medical profession of the State of Minnesota has much to gain by promoting those fundamental aims of the University Medical School. They are purposes which serve the needs not only of the State as a whole, but particularly of the profession, because centers of research are the great flowing springs from which progress emanates. In no other activity is it as true as in medicine that to stand still is to move backward, because the forward stream of general progress does not cease. One can never find a mooring to stay at rest in medicine and remain in the first rank. A great University center of research is indispensable to the welfare of the Minnesota medical profession. In the future as in the past we must maintain the public appreciation of the importance of such work in order to safeguard the support on which it depends. The first fifty years are past, the future is ahead. Our predecessors have made the Medical School of this State what it is today. It is our job, not to rest on our oars and their laurels, but to continue to push forward, only so can we maintain the tradition

of the past and keep the profession of medicine in Minnesota and the Northwest in the front rank.

INITIALED MEDICAL TERMS CONFUSE

There is need of another dictionary—one that will contain, in alphabetical order, all initialed abbreviations of these modern times. Physicians have been accustomed to some such short cuts in their nomenclature; but when those who held commissions in the M. R. C. of the regular army prior to the World War were required to take the correspondence course to fit them for active service, they were astounded at the numerous instances of abbreviation in military parlance. Actual war operations increased the usage tremendously, and in later years political organizations have availed themselves of this expediency to a great extent.

In visiting a highly organized clinic, it is interesting to observe how time is saved in various places by the same procedure. In the X-ray department, numbered booths line the corridor and attendants conduct patients to and from tables, while technicians carry out the snappy orders of the case assigning nurse. "Shoot a G. B. in six," is certainly not wasting the King's English. The operator quickly enters the little enclosure and says, "Take a deep breath, hold it," and turns on the juice. Again you hear his monotonous command, "Once more, take a deep breath, hold it." Then he emerges to do an A. P. or attend to some other alphabetical problem in another cubicle. Visiting physicians must be on their toes too to comprehend the latest time-saving initials recorded by the new set of hospital interns each year.

Sooner or later, we shall require a board to pass upon the orthodoxy of these appendectomized words. Some of them are of Latin origin and long usage, as the O.D. and O.S. of the oculist, the t.i.d., a.c., and p.r.n. of the prescription writer, and the letters indicating the various intrauterine positions recorded by the obstetrician; but since the War, in particular, there have been many injections from English phrases. Some of these are doubtlessly good, as in the case of E.K.G. and B.M.R.; but when one runs across such an expression as G.P.R. for the first time, the meaning is not clearly conveyed. We cannot afford to sacrifice clarity for brevity, and so we say, physicians need an I.M.L. Lexicographers, please take notice.

A. E. H.

Book Reviews

Varicose Veins, by ALTON OCHSNER, M.D., William Henderson professor of surgery and director of the department of surgery, School of Medicine, Tulane University of Louisiana, and HOWARD MAHORN, M.D., assistant professor of surgery, Tulane University; 147 pages, 50 text illustrations, 2 color plates; St. Louis: C. V. Mosby Co. Price, \$3.00.

A 3% incidence of varicose veins in a large group of patients warrants an understanding of the clinical manifestations and the treatment of this condition. Prior to the last two decades

the treatment of varicosities has been unsatisfactory because the therapy consisted principally of operative measures which were attended by a high morbidity and a high mortality. With the improvements in injection treatment of varicose veins in the previous decade, the immediate satisfactory results seemed to indicate that the ultimate in therapy had been attained. Subsequently, however, disappointing results in the form of recurrences were observed. This necessitated further efforts to improve the treatment. Detailed investigations on patients with varicose veins have demonstrated that the disturbed physiology in these patients varies considerably. A more complete understanding of the disordered function which can be determined more accurately by the use of appropriate diagnostic tests permits the formulation of a rational therapy. In this presentation an attempt is made to evaluate the clinical studies and methods of treatment and to present briefly the most modern therapy.

The 1938 Year Book of General Therapeutics, edited by BERNARD FANTUS, M.S., M.D., professor of therapeutics, University of Illinois College of Medicine; member, Committee on Revision of the U. S. Pharmacopeia and of the National Formulary Revision Committee; director of therapeutics, Cook County Hospital; and AARON L. GOLDBERG, M.D., assistant in medical dispensary, University of Illinois; Chicago: Year Book Publishers, Inc.

Dr. BERNARD FANTUS has retained the editorship of the *Year Book of General Therapeutics* for twenty-one years, and the 1938 Year Book is the largest that he has published. Approximately two thousand medical articles are studied from the year's clinical literature. Material was selected according to two criteria: "Is it new?" and "Is it sound?—has it been proved clinically—is it ready for application in the average condition of progressive practice?"

A total of 474 articles is abstracted in this volume, making this book a progressive—yet conservative, up-to-date treatise in general therapeutics. Especially have been stressed those newer findings in regard to sulfanilamide, the vitamins, the endocrines, the newer forms of insulin, anesthetic drugs, refinement in transfusion—technics, methods and indications for injection therapy, and prescription writing. As the *Lancet* (London) said, "Guides are almost indispensable in the maze of medical literature; the Year Books are competent ones."

Gonorrhea in the Male and Female, by P. S. PELOUZE, M.D.; 471 pages plus index; 3rd edition; Philadelphia: W. B. Saunders Company; 1939.

This third edition is the last word in gonorrhea. It surpasses by far the author's previous works. Every chapter teems with the practical and philosophical approaches with which patients suffering from this disease must be dealt. It is worthy of a place in every physician's and nurse's library, and may be called the most worthwhile book of the decade on gonorrhea.

Poisonous Plants of the United States, by WALTER CONRAD MUENSCHER, professor of botany, New York State College of Agriculture; 239 pages, bibliography 11 pages plus index; New York: The Macmillan Company; 1939. Price, \$3.50.

A brief compilation of the poisonous plants and their classification is presented in this volume. About 400 species of poisonous plants, representatives of 68 families, are discussed. There are 75 drawings which simplify the identification of the various plants. A very practical compend for physicians, botanists and people in animal husbandry.

Gross Anatomy, by A. BRAZIER HOWELL, associate professor of anatomy, Johns Hopkins University School of Medicine; 379 pages plus index; New York: Century Co., Inc.; 1939.

This is a very practical textbook systematizing the macroscopic structures of the human body. Microscopic as well as minute insignificant details are omitted, thereby eliminating the confusion which confronts students in their first year of anatomy and avoiding the use of the laboratory manual as a text. There are 56 diagrams illustrating the most confusing structures. This is a very concise, practical reference for all students and any physician's library.

The 1938 Year Book of Dermatology and Syphilology, by FRED WISE, M.D., and MARION SULZBERGER, M.D.; 692 pages plus index; Chicago: The Year Book Publishers, Inc.; 1939. Price, \$3.00.

The authors have very concisely summarized the newest trends in the dermatologic literature. Therapy of common skin diseases, syphilis and allergic skin disease is all simplified. One needs only to read this year book to keep up with the dermatologic trend of the entire world. It is a very valuable book for dermatologists as well as all physicians who have occasion to deal with the problems of skin diseases.

The Pneumonias, by HOBART A. REIMANN, M.D., professor of medicine, Jefferson Medical College, Philadelphia, formerly professor of medicine, University of Minnesota, formerly associate professor of medicine, Peking Union Medical College, Peking, China; with foreword by RUFUS COLE; Philadelphia & London: W. B. Saunders Company; 1938.

Dr. REIMANN's volume, *The Pneumonias*, is a book which is intended for the general practitioner and the student of medicine. It is primarily designed to emphasize modern methods of classification, diagnosis, prevention and treatment of acute pulmonary infections. The more recent advances in the knowledge of pneumonias has replaced the older methods of classification and nomenclature of this disease. The topics of etiology, epidemiology, pathogenesis and roentgenographic examinations have been emphasized at the expense of physical signs and gross pathology. The academic aspects of pneumonia have been stressed, since all of the recent advances in knowledge of this disease are based on them.

This volume truly answers the objectives for which it was prepared, namely its use by the general practitioner and the student of medicine.

Standard Bodyparts Adjustment Guide; 170 pp. loose-leaf with bibliography and self-pronouncing glossary; Chicago: Insurance Statistical Service of North America; 1939; \$8.00 including 10 years' revision service.

The nature and background of industrial injuries or occupational diseases is usually a terra incognita to most laymen, claim adjusters, lawyers and insurance officials who are called upon to settle monetary considerations arising out of traumatic injuries and other conditions covered by insurance. This well illustrated volume, though originally intended for insurance men, should nevertheless be of interest to physicians and surgeons who have only occasional contact with compensable and insurable cases. It will be of especial value to those who are called upon to give expert testimony in such cases.

The features of this compilation are the following: a composite coast-to-coast average of medical fees for every type of service; a description of miscellaneous traumatic and bone injuries and their resultant disability periods; a persuasive percentage method for evaluating loss-of-use conditions; a comprehensive digest of regulations evolved under compensation statutes; a concise analysis of occupational disease signs, symptoms and environments; a readable text of 170 pages keyed to a self-pronouncing glossary; and a realistic reproduction of the incomparable Froche Anatomical Charts, keyed to Latin and English definitions.

The Heart in Pregnancy, by JULIUS JENSEN, Ph.D., M.R.C.S., L.R.C.P.; first edition, 342 pages; St. Louis: C. W. Mosby Co.

The author has added a useful and sane work to the scattered literature on this subject. He has painstakingly assembled and analyzed the historical as well as the present world literature and has added his own extensive observations. He has emphasized the necessity of considering the functional capacity of the heart as well as the anatomic lesion, in accordance with modern cardiology. The normal physiological changes of the heart and circulation in pregnancy are well explained. The difficulty of establishing definite indications for the termination of pregnancy in the presence of heart disease is brought out, and the treatment for various conditions given. The book should be extremely valuable to anyone doing cardiology, internal medicine, or obstetrics. A voluminous bibliography is appended to the end of the text.

The Vaginal Diaphragm, Its Fitting and Use in Contraceptive Technique, by LE MON CLARK, M.S., M.D.; 107 pages; St. Louis: C. V. Mosby & Company; 1939.

This monograph is a practical and complete study of this method of contraception. The author answers all of the physicians' questions pertaining to this technique. Valuable information as to imparting instructions to patients is given.

Future Meetings

FIFTIETH ANNIVERSARY OF THE MEDICAL SCHOOL OF THE UNIVERSITY OF MINNESOTA

October 12, 13, 14, 1939

THEME: *Some Trends in Medical Progress
with Particular Reference to Chemistry in
Medicine.*

Anniversary Celebration

Half a century ago three private medical schools in Minneapolis and St. Paul turned over their charters and their properties to the Regents of the University of Minnesota. This occurred not by mere chance, but because of the untiring and statesmanlike efforts of a group of physicians, headed by Dr. Perry H. Millard, who envisioned for the State of Minnesota a single, strong, progressive Medical School as part of the State University.

The development of this school over its first half century—less than the life span of a single individual—has far exceeded the hopes and expectations of its founders. To take stock of progress to date, to pay tribute to the founders of the School and the builders of its name and to cast glances toward the future the special program herein described has been arranged.

The scientific sessions have been planned primarily for alumni, students, faculty, and other physicians, and scientists in related fields. To the University Convocation on Thursday morning and the General Session in Northrop Auditorium on Thursday evening the general public is especially invited; but all who are interested are cordially welcome to attend any of the sessions.

Schedule of Events

Monday to Wednesday, October 9, 10, 11—Medical Clinics arranged by Division of Postgraduate Medical Education.

Thursday, Friday, October 12, 13—Special Anniversary Program.

Saturday Morning, October 14—Anniversary Clinics.

Saturday Afternoon, 2:00 O'Clock—Football game, Purdue University vs. University of Minnesota, Memorial Stadium.

PROGRAM

for the Commemoration of the Fiftieth Anniversary of the Founding of the Medical School of the University of Minnesota

Thursday, October 12, 1939

Morning Session, 9:00 O'Clock
Auditorium of Music Building

"The Colloid Chemistry of Membranes in Living Organisms"—Herbert M. Freundlich, distinguished service professor, University of Minnesota.

"The Performance of Osmotic Work in Living Systems"—Maurice B. Visscher, professor of physiology, University of Minnesota.

"Some Reactions by Which Solutes May Be Differentially Concentrated by the Kidney"—John P. Peters, professor of medicine, Yale University.

"Medical Education, Research, and the Public Health"—Thomas Parran, Jr., surgeon-general, United States Public Health Service (University Convocation Address, 11:30 a. m., Northrop Auditorium).

Luncheon Round-Table Discussions, 12:30 O'Clock
Minnesota Union

"The Clinical Significance of Water and Electrolyte Balances."

"Blood Regeneration in the Anemias."

"Clinical Problems of Thrombosis."

"Current Trends in Public Health."

Afternoon Session, 2:30 O'Clock
Northrop Auditorium

"Organic Chemistry in the Pursuit of Vitamin Research"—Lee I. Smith, professor of organic chemistry, University of Minnesota.

"Investigations in Metabolism of the Fatty Acids"—George O. Burr, professor of physiological chemistry and botany, University of Minnesota.

"Production, Utilization and Significance of Blood Proteins" (annual lecture of the Minnesota Pathological Society)—George H. Whipple, professor of pathology and dean of the medical school, University of Rochester.

"Investigations in the Problem of Thrombosis"—Charles H. Best, professor of physiology, University of Toronto.

Evening Session, 8:00 O'Clock
Northrop Auditorium

"Medicine and the Commonwealth"—The Honorable Harold E. Stassen, Governor of the State of Minnesota.

"The Place of Medicine in a University"—Guy Stanton Ford, president, University of Minnesota.

"The Role of the Fundamental Sciences in Medical Progress" (the first Elias Potter Lyon lecture)—Anton J. Carlson, distinguished service professor of physiology, University of Chicago.

Friday, October 13, 1939

Morning Session, 9:00 O'Clock
Northrop Auditorium

"Recent Chemical Trends in the Study of Immunity"—Michael Heidelberger, professor of biochemistry, Columbia University.

"The Biology of Animal Virus Diseases"—Robert G. Green, professor of bacteriology, University of Minnesota.

"Observations upon the Mode of Action of Sulfanilamide and Its Derivatives"—Perrin H. Long, associate professor of medicine, Johns Hopkins University.

"Chemistry in Urinary Antisepsis"—Henry F. Helmholtz, professor of pediatrics, The Mayo Foundation, University of Minnesota.

Luncheon Round-Table Discussions, 12:00 O'Clock
Minnesota Union

"Chemotherapy".

"Clinical Aspects of the Vegetative Nervous System."

"Clinical Physiology of the Gastro-Intestinal Tract."
"Neurophysiology".

"Mechanism and Manifestations of the Immune Response."

Chairman—A. T. Henrici, professor of bacteriology, etc.

Leader of Discussion: M. Heidelberger, professor of biochemistry, Columbia University.

**Afternoon Session, 2:00 O'Clock
Auditorium of Music Building**

"The Chemical Approach to the Problem of Convulsive Mechanisms"—Irvine McQuarrie, professor of pediatrics, University of Minnesota.

"Methods of Analysis of Nervous Action"—Herbert S. Gasser, director, Rockefeller Institute for Medical Research.

"The Nervous System in the Regulation of Visceral Processes"—Detlev W. Bronk, professor and director, Institute of Neurology, University of Pennsylvania.

"The Argument for Chemical Mediation of Nerve Impulses" (the annual Alpha Omega Alpha lecture)—Walter B. Cannon, professor of physiology, Harvard University.

**Evening Session, 6:30 O'Clock
Ballroom, Minnesota Union**

"The Medical School of the University of Minnesota in Retrospect and Prospect"—Harold S. Diehl, dean of the medical sciences, University of Minnesota.

"The Medical School from the Point of View of the Alumni" (the Herman M. Johnson lecture of the Minnesota State Medical Association)—Olaf J. Hagen, Class of 1906, Moorhead, Minnesota.

"Graduate Medical Education"—Donald C. Balfour, director, The Mayo Foundation, University of Minnesota.

Presentation of Distinguished Service Award of Minnesota State Medical Association Posthumously to Dr. William J. Mayo, Dr. Charles H. Mayo, and Dr. Herman M. Johnson—Dr. George Earl, president of the Minnesota State Medical Association.

"Progress in Medical Education on the American Scene"—Richard E. Scammon, distinguished service professor, University of Minnesota.

Saturday, October 14, 1939

**Morning Session, 9:00 O'Clock
Amphitheater, University Hospital**

Anniversary Clinics

"The Surgical Consideration of Essential Hypertension"—Alfred W. Adson, professor of neurosurgery, The Mayo Foundation, University of Minnesota.

"A Physiological and Surgical Critique of the Surgeon's Role in the Management of Peptic Ulcer"—Owen H. Wangenstein, professor of surgery, University of Minnesota.

"Certain Physiologic Concepts Important in the Practice of Cardiology"—Arlie R. Barnes, professor of medicine, The Mayo Foundation, University of Minnesota.

"Some Disturbances of the Vascular System in Pregnancy"—John L. McKelvey, professor of obstetrics and gynecology, University of Minnesota.

"Sprue and Related Diseases Affecting Intestinal Ab-

sorption"—Albert M. Snell, associate professor of medicine, The Mayo Foundation, University of Minnesota.

"Jaundice Due to Cancer"—Cecil J. Watson, associate professor of medicine, University of Minnesota.

There will be a luncheon meeting of the Minnesota Medical Alumni Association, University Hospital Dining Room, 12:30 P. M.

In connection with the Fiftieth Anniversary Celebration of the Medical School of the University of Minnesota, the Committee in charge wishes to extend a special invitation to Alumni and others to bring their wives or other relatives or friends to the Banquet on Friday evening at 6:30 P. M. in the Ballroom of the Minnesota Union. Formal or informal dress is optional.

**NORTH DAKOTA SOCIETY OF
OBSTETRICS AND GYNECOLOGY**

The semi-annual meeting of the North Dakota Society of Obstetrics and Gynecology will be held at the Ryan Hotel, Grand Forks, North Dakota, on Saturday, October 21, 1939.

The following program has been arranged by Dr. W. A. Liebeler, Grand Forks, North Dakota, Chairman of the Program Committee:

1. A Fifteen Year Review of Carcinoma of the Cervix Uteri at St. John's Hospital, Fargo, North Dakota, by J. F. Hanna, M.D., Fargo.
2. Medical Induction of Labor Near Term, by John D. Graham, M.D., Devils Lake.
3. Pyelitis in Pregnancy: Report of Cases, by H. Robert Ransom, M.D., Grand Forks.

The guest speaker, who will address the dinner meeting of the society will be Dr. Lawrence M. Randall of the Mayo Clinic, Rochester, Minnesota. His subject will be "Some Clinical Phases of Endocrinology."

PHYSICIANS WANTED FOR CCC DUTY

Medical service for the Civilian Conservation Corps has, in the past, been furnished by the medical section of the Officers' Reserve Corps with the exception of a few doctors who were employed on a contract basis. A recent decision of the Director of the CCC and the War Department permits the employment of doctors who are not Medical Reserve officers in this service.

Doctors needed for this service may now be employed under the rating of civilian employees or on a contract basis, the initial pay being \$2600 per annum. No quarters for families are provided, and the doctor will be required to pay for his food at camps. Temporary quarters for the doctor will be provided at the camps for a nominal fee. Doctors selected for this service will be required to pay their own travel expenses to the nearest district headquarters, where they will be put on temporary duty for instructional purposes before being sent to camps. Travel expenses incurred in the transfer of doctors from the district headquarters to camps or in the transfer from one camp to another will be paid by the Government. If the services rendered are satisfactory, the employment is more or less permanent.

The principal duties at camps consist of the medical care of the enrollees and the practice of preventive medicine. To be eligible for this service, the doctor must be legally qualified to practice medicine and physically able to perform the duties involved.

All doctors interested in this type of service are requested to submit their applications to the office of the Surgeon, Headquarters Seventh Corps Area, Federal Building, Omaha, Nebraska, giving date when available and preference of assignment in the following states: Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Missouri, Kansas, and Arkansas.

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News Items

Dr. James Morrow, Austin, is the new president of the Southern Minnesota Medical association. Other officers are: Dr. Charles Koenigsberger, Mankato, first vice-president; Dr. E. A. Kilbride, Worthington, second vice-president; Dr. N. W. Barker, Rochester, secretary-treasurer.

Dr. David A. Sher who practiced at Cold Spring, Minnesota for the past four years, has opened an office at Austin.

Dr. Charles McLachlan of New Rockford, North Dakota, former Dunseith Sanatorium head, was recently honored by fellow physicians on the occasion of his 50th year of practice.

Dr. Owen Parker, Ely, was elected president of the North Minnesota Medical association at the annual convention, September 9, 1939. Other new officers are Dr. W. T. Wenner, St. Cloud, vice-president, and Dr. Clarence Jacobson, Chisholm, secretary and treasurer.

Dr. M. Vik, Onamia, was elected president of the Eastern Minnesota Medical association recently.

Dr. G. W. Clifford, formerly of Osakis has opened an office in Alexandria, Minnesota.

Dr. Ralph Vinje, formerly of Ada, Minnesota, has taken over the practice of Dr. P. F. Rasmusson in Beulah, North Dakota. Dr. Rasmusson has retired.

Dr. Elmer E. Keithahn, Fairmont, Minnesota, has become associated with Dr. George E. Sherwood at Kimball, Minnesota.

With Dr. Gordon R. Kammann, St. Paul neuro-psychiatrist as its chairman, an advisory committee of specialists has been appointed to assist with formation of a program for handling Minnesota's feeble-minded and epileptic problem. Serving with Dr. Kammann are the following physicians: Dr. Max Seham, Dr. J. C. McKinley, Dr. Royal C. Gray, Dr. D. E. McBroom and Dr. E. J. Engberg.

The new superintendent of the San Haven, South Dakota, state tuberculosis sanatorium is Dr. Cedric Northrup of Dallas, Oregon. He succeeds Dr. G. Alfred Dodds.

Dr. J. O. Arnson, Bismarck, North Dakota, has been appointed physician of the state penitentiary. He succeeds Dr. M. W. Roan, also of Bismarck.

The Minnesota Medical Alumni Association will meet on October 14 at 9 a. m. in the Eustis Amphitheater of the University Hospital in conjunction with the program for the commemoration of the fiftieth anniversary of the founding of the Medical School. A group of clinics has been arranged by Dr. William A. O'Brien, to be presented by Doctors Adson, Wangensteen, Barnes, McKelvey, Snell, and Watson. This program will be followed by the annual luncheon meeting, compliments of the University Hospital, when the revised constitution will be presented for adoption.

Dr. Harold F. Buchstein has returned to Minneapolis and has opened offices for the practice of neurological surgery. Dr. Buchstein was formerly a fellow on neuro-surgery at the Mayo Foundation and more recently honorary research fellow at Yale University.

Dr. R. O. Goehl of the Healy, Law and Woutat Clinic of Grand Forks, North Dakota, was recently certified by the American Board of Internal Medicine.

Necrology

Dr. Henry O'Keefe, 84, of Grand Forks, North Dakota died in a St. Paul, Minnesota, hospital Sept. 2, 1939. He had practiced in Grand Forks the past 33 years.

Dr. Harry Clay Smith, 67, of Missoula, Montana died September 13, 1939. He had practiced in Missoula since 1904.

Dr. M. C. Schenecker, 80, pioneer doctor of Webster, South Dakota, died September 4, 1939. Dr. Schenecker came to Day county in 1885, settling at Bristol where he resided until 1907 when he came to Webster.

EXAMINATIONS

American Board of Obstetrics and Gynecology

The next written examination and review of case histories (Part I) for Group B candidates will be held in various cities of the United States and Canada on Saturday, January 6, 1940, at 2:00 P. M. *The Board announces that it will hold only one Group B, Part I, examination this year prior to the final general examination, instead of two as in former years.* Candidates who successfully complete the Part I examination proceed automatically to the Part II examination held in June 1940.

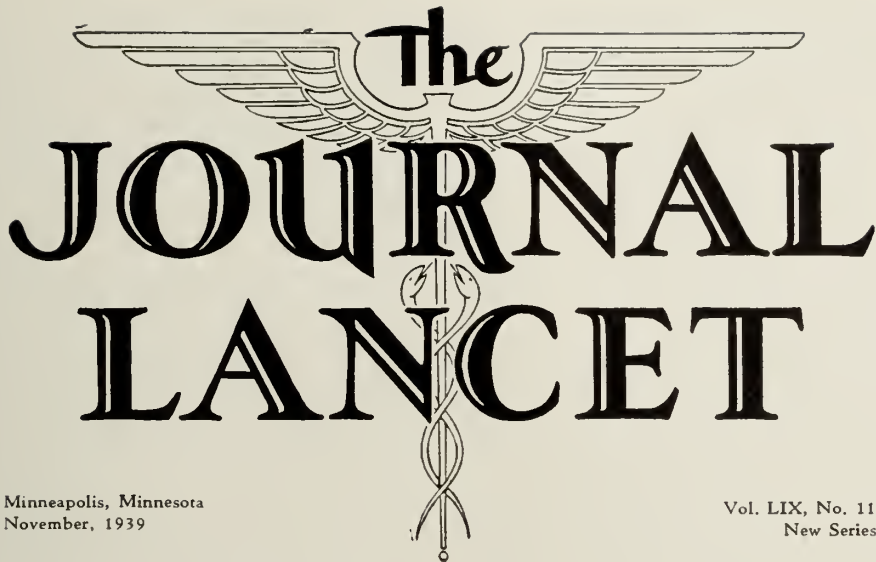
Applications for admission to Group B, Part I, examinations must be on file in the Secretary's office not later than October 4, 1939.

The general oral and pathological examinations (Part II) for all candidates (Groups A and B) will be conducted by the entire Board, meeting in Atlantic City, N. J., on June 8, 9, 10, and 11, 1940, immediately prior to the annual meeting of the American Medical Association in New York City.

Applications for admission to Group A, Part II examinations must be on file in the Secretary's office not later than March 15, 1940.

After January 1, 1942, there will be only one classification of candidates, and all will be required to take the Part I examinations (written paper and case records) and the Part II examinations (pathological and oral).

For further information and application blanks, address Dr. Paul Titus, Secretary, 1015 Highland Building, Pittsburgh (6), Pennsylvania.



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The Fiftieth Anniversary of the Medical School of the University of Minnesota

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Minneapolis, Minnesota

THE occasion of the Fiftieth Anniversary of the Founding of the Medical School of the University of Minnesota is an important one to the physicians of the Northwest. It represents a milestone in the progress of medicine on this scene. The quality of medical practice and the standards of medical education and research are intimately bound up one with another. When the publisher of THE JOURNAL-LANCET suggested that an issue of that organ be devoted to a summary of events of the celebration and a history of the medical school, because of their importance to northwestern medicine, the committee in charge of the celebration was pleased to respond. A medical school is not an independent entity, it is a part of the community and must serve the needs of that community if it has a right to exist. The medical school must be understood by the community, which is possible only if the medical profession as a whole is thoroughly acquainted with its work.

This account will be divided into three portions: the first will tell the more important facts about the history of the Medical School of the University of Minnesota. The second will comprise abstracts and quotations from the scientific papers bearing on the theme, "Chemistry in Medicine." The third section will be a report upon the public meetings held in connection with the celebration.

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I. The History of the Medical School

The half century mark seems to be an appropriate occasion to review the record of the past and take stock of the future. The Medical School of the University of Minnesota completed this year 50 years of service to the community. Its history has in many respects been an unusual one. Even some of the bare facts of requirements for admission, of size of staff, of material facilities in buildings and equipment and the content of the medical curriculum itself, tell a story.

The University of Minnesota began in a very modest way as a Land Grant college. A thumb-nail account of the founding and the general organization of the University from the early days is to be found in the official calendar for the year 1882-1883, prepared under the presidency of Dr. William W. Folwell and probably written by him. Because of the importance of the real situation in those early days and of the ideals of the pioneers, it is impossible to understand the subsequent course of events without knowledge of those times. The most realistic picture can be obtained by the contemporary description and therefore the following excerpt will be of interest:

EXCERPT FROM THE 1882 CALENDAR OF THE UNIVERSITY OF MINNESOTA HISTORICAL

In the act creating the Territory of Minnesota, approved March 2, 1849, the Congress of the United States granted two townships of public lands for the endowment of a university. By an act approved February 9, 1851, two additional townships were granted for the same purpose.

The University practically dates its organization from the law of the State approved February 18, 1868, entitled "An Act to reorganize the University of Minnesota, and to establish an Agricultural College therein."

A preparatory department was opened in October, 1867. In 1869 the first faculty, consisting of a president and eight professors, was formed, and the first college class was organized. The first annual commencement was held June 19, 1873.

The Legislature of 1881 appropriated the sum of \$30,000 a year for six years for the erection and outfit of the following additional buildings: a farmhouse, a building for the College of Mechanic Arts, a military building, an astronomical observatory, a museum and a library.

The history of the Medical School of the University of Minnesota actually began with the year 1888 when all but one of the then existing colleges of medicine in the Twin Cities offered their charters and their properties to the Board of Regents of the University on the condition that the latter would set up and maintain a University School of Medicine. It would have been too much to expect that with its very limited funds the University could have caused to be born, full grown, a scientific institution fully equipped and staffed to undertake the difficult work of educating physicians. In the year of the founding of the Medical School, the faculty of the entire University comprised 98 members. A large proportion of these persons were part-time appointees. This number is to be contrasted with the 1500 full-time members of the faculty of the University of Minnesota in 1939, which figure does not account for the many hundreds of part-time appointments in the medical and other professional schools. In 1888 the Medical School had one full-time appointee, J. C. Bell, who was professor of chemistry.

The records of these early years are difficult of access but nevertheless important to a proper perspective. The founders of this medical school laid a ground work for progressive education. By comparison with present day standards their facilities and their requirements were low. It would be entirely unfair, however, to judge them on the basis of present-day standards. The quality of their work and the range of their vision can be judged fairly, only in the light of the conditions of their day. By that standard the Medical School of the University of Minnesota in 1888 stood as one of the leaders in progressive medical education. Its founders intended that it should be in the front ranks and if there is any single factor which is responsible for the calibre of the medical school today, it is the simple determination, on the part of leaders in medical education in the State of Minnesota, to make its medical school lead rather than follow the procession.

Again there could be no better way of sketching the real situation in 1888 than by reprinting the first announcement concerning medical education in the University of Minnesota. This statement appears as a description of work in the Department of Medicine in which there were three divisions, the College of Medicine and Surgery, the College of Homeopathic Medicine and Surgery, and the College of Dentistry. In order to provide a basis for comparison with present day situations, the contents of this announcement are quoted.

EXCERPT FROM THE UNIVERSITY CALENDAR FOR 1888

DEPARTMENT OF MEDICINE

Cyrus Northrop, LL.D. President
Perry H. Millard, M.D. Dean

This Department is composed of the following colleges, viz.: The College of Medicine and Surgery, the College of Homeopathic Medicine and Surgery, and the College of Dentistry.

HISTORICAL

The University of Minnesota, with all its departments, is located at St. Anthony Falls by a constitutional act. The original act, as adopted by the vote of the people of the territory in 1853, provided, among other departments, for a department of Medicine and Surgery. The Board of Regents established a College of Medicine and Surgery in 1882. The duties of the faculty were limited to the examination of applicants for the degrees of M.B. and M.D., and to the performance of work assigned to it by the legislature as "a State Board of Medical Examiners." This faculty, acting in its capacity as a board of examiners, secured the enactment of a new medical law in 1887, creating a new and independent board, to be appointed by the Governor; thus dispensing, to a great extent, with the necessity of its own further continuance.

On the 7th of April, 1887, a committee of the faculty waited upon the Board of Regents, in session at the capitol, and urged the propriety of establishing a teaching school of medicine with a high curriculum. This committee consisted of Drs. D. W. Hand, C. N. Hewitt and P. H. Millard, who made a written report exemplifying the necessity of, and the advantages to accrue from a high grade school. The question of establishing a department of medicine was referred to a special committee of the Board of Regents.

At a meeting of the Board of Regents, held February 28, 1888, a committee of the Boards of Trustees of the Minnesota Hospital College and of the St. Paul Medical School appeared and tendered the use of the properties of these schools to the State for medical college purposes. The leases of the property were offered the State for a period of five years, and the property was accepted by the board.

In March, the Board of Trustees of the Minnesota Homeopathic Medical College also made a formal proposal to the Board of Regents to waive its charter as a college and cease to teach, provided Homeopathy should have a fair representation in the new medical department of the University. It offered also to provide such a place for the work of the Homeopathic faculty as the regents might require.

A committee, consisting of Dr. D. W. Hand, President of the State Board of Medical Examiners, Dr. Chas. F. McComb, President of the State Medical Society, Prof. Cyrus Northrop, President of the State University, and Dr. Perry H. Millard, Dean of the Medical Department of the University of Minnesota, was thereupon appointed by the Board with instructions to nominate a faculty for the College of Medicine and Surgery, and the College of Dentistry.

LOCATION

The University proper is located in East Minneapolis, corner of University and Fourteenth avenues S. E., but the lectures will be delivered and the laboratory work will be conducted at the buildings formerly occupied by the Minnesota Hospital College, corner of Sixth street and Ninth avenue South, near which point students should secure lodgings. The clinical instruction will be given at the various dispensaries and hospitals in both Minneapolis and St. Paul.

QUALIFICATIONS

Applicants for admission to the College of Medicine and Surgery, the College of Homeopathic Medicine and Surgery, or the College of Dentistry will be required to prove their fitness to enter these colleges:

1. By writing legibly and correctly an English composition of not less than two hundred words.
2. By translation of easy Latin prose, or, in lieu thereof, by passing an examination upon one of the following subjects: French, German or one of the Scandinavian languages.
3. By passing an examination upon either the elements of Algebra, Plane Geometry, or Botany.
4. By showing such a knowledge of Physics as may be ob-

tained from the study of Gage's, Avery's, or Balfour Stewart's Elements of Physics.

It is provided, however, that no examination for admission shall be required of matriculants or graduates of any reputable college of Science, Literature and Arts; of graduates of State High Schools or Normal Schools; of persons holding a first-class teacher's certificate, or the certificate of the High School Board of the State of Minnesota.

COURSE

The curriculum in the department of Medicine covers a period of three years, each year of which represents a course of lectures of six months duration.

WINTER TERM

The course of lectures in this department will commence October 1, and will continue until the end of March. This is the essential part of the college year.

SPRING SESSION

A spring course will be conducted in each of the colleges, beginning April 1, at the close of the winter term, and extending over a period of nine weeks. Attendance upon this course is desirable, but is not obligatory. It is supplemental to the longer winter session, but cannot be regarded as a substitute or equivalent therefor.

DEGREES

In the department of medicine, the following degrees will be granted by the university:

To graduates of the College of Medicine and Surgery, the degree of Doctor of Medicine, (M.D.).

To graduates of the College of Homeopathic Medicine and Surgery, the degree of Doctor of Medicine, (M.D.).

To graduates of the College of Dentistry, the degree of Doctor of Dental Surgery, (D.D.S.).

Graduates of the College of Dentistry can obtain the degree of Doctor of Medicine by attending one full course of lectures in either of the allied colleges and by passing the final examinations required therein. Similarly, graduates of the College of Medicine and Surgery, or of the College of Homeopathy, can obtain the degree of Doctor of Dental Surgery by attending one full course of lectures in the College of Dentistry and by passing the final examinations in that college.

FEES

Students of the College of Medicine and Surgery, the College of Homeopathic Medicine and Surgery, and the College of Dentistry, will be uniformly charged as follows:

Matriculation fee, payable annually, for students who are residents of Minnesota, \$10.00; for all others, \$25.00.

Lecture courses, each year, for students of Minnesota, \$25.00; for all others, \$35.00.

THE COLLEGE OF MEDICINE AND SURGERY

The Faculty

CYRUS NORTHPROP, LL.D.

President

A. F. RITCHIE, M.D.

Professor of Anatomy

RICHARD O. BEARD, M.D.

Professor of Physiology

J. C. BELL

Professor of Chemistry

H. M. BRACKEN, M.D., L.R.C.S.E.

Professor of Materia Medica and Therapeutics

ALBERT E. SENKLER, M.D.

Professor of Theory and Practice of Medicine

CHARLES H. HUNTER, A.M., M.D.

Professor of Clinical Medicine and Pathology

EVERTON J. ABBOTT, A.B., M.D.

Professor of Clinical Medicine

CHARLES A. WHEATON, M.D.

Professor of Principles and Practice of Surgery

FREDERICK A. DUNSMOOR, M.D.

Professor of Clinical and Operative Surgery

PERRY H. MILLARD, M.D.

Dean and Professor of Clinical Surgery

PARKS RITCHIE, M.D.

Professor of Obstetrics

ALEX J. STONE, LL.D., M.D.

Professor of Diseases of Women

AMOS W. ABBOTT, M.D.

Clinical Professor of Diseases of Women

JOHN F. FULTON, Ph.D., M.D.

Professor of Ophthalmology and Otology

FRANK ALLPORT, M.D.

Clinical Professor of Ophthalmology and Otology

C. EUGENE RIGGS, A.M., M.D.

Professor of Diseases of the Nervous System

CHARLES H. BOARDMAN, M.D.

Professor of Medical Jurisprudence

ARTHUR B. ANCKER, M.D.

Professor of Hygiene

JAMES H. DUNN, M.D.

Professor of Diseases of the Genito-Urinary System

CHAS. L. WELLS, A.M., M.D.

Professor of Diseases of Children

JAMES E. MOORE, M.D.

Professor of Orthopaedic Surgery

M. P. VANDERHORCK, M.D.

Professor of Diseases of the Skin

W. S. LATON, M.D.

Professor of Diseases of the Throat and Nose

J. CLARK STEWART, B.S., M.D.

Professor of Histology and Bacteriology

J. W. BELL, M.D.

Professor of Physical Diagnosis and Diseases of the Chest

E. C. SPENCER, A.B., M.D.

Professor of Surgical Anatomy

A. B. CATES, A.M., M.D.

Adjunct Professor of Obstetrics

W. A. JONES, M.D.

Adjunct Professor of Diseases of the Nervous System

BURNSIDE FOSTER, M.D.

Demonstrator of Anatomy

COURSE OF INSTRUCTION

First Year: Anatomy, Chemistry, Histology, Physiology, Materia Medica, Laboratory Work.

Second Year: Continuation of first year studies, Pathology, Medical Jurisprudence, Theory and Practice, Clinical Medicine, Obstetrics, Diseases of Children, Physical Diagnosis, Hygiene, Surgery, Clinical Surgery, Gynecology, Clinical Instruction.

Third Year: Continuation of second year studies (without those of the first year), Neurology, Ophthalmology, Dermatology, Laryngology, Electro-therapy, Otology, Genito-Urinary Diseases, Orthopaedia, Clinical Instruction in all branches.

ANATOMY

Anatomy will be taught by lectures, dissections, under the demonstrator, and recitations.

Text Books—Gray's Anatomy and Holden's Landmarks.

Collateral Reading—Quain's Anatomy and Holden's Osteology.

PHYSIOLOGY

Lectures, practical demonstrations in the laboratory and recitations.

Text Books—Foster and Yeo.

Collateral Reading—Landois and Stirling and Chapman.

CHEMISTRY

Lectures in General and Organic Chemistry; laboratory course, including qualitative analysis, Toxicology and Urinalysis.

Text Books—Attfeld, Green's Medical Chemistry.

Collateral Reading—Bowman, and Taylor on Poisons.

HISTOLOGY AND BACTERIOLOGY

Lectures and laboratory work. The student will be taught to mount normal tissues and specimens containing bacteria. The course in Normal Histology and Bacteriology will cover a period of not less than six weeks. If possible the student will provide himself with a microscope.

Text Books—Prudden's Practical Histology, Shaefer's Essential Histology.

Collateral Reading—Cornil and Ranvier.

PATHOLOGY

Pathology and Morbid Anatomy will be taught by lectures, recitations, and work in the dead house. The technique of the autopsy will be carefully dwelt upon so that each student can learn to make a careful post-mortem examination. Diseased processes will be illustrated by fresh and alcoholic specimens,

that theories of disease may be as much matters of demonstration as the nature of the subjects will admit.

Text Books—Delafield and Prudden, Cornil and Ranvier, Orth.

MATERIA MEDICA AND THERAPEUTICS

Lectures, practical demonstrations in the laboratory and recitations.

Text Books—Wood and Bartholow.

Collateral Reading—Mann.

OBSTETRICS

Lectures, illustrated by operations on the manakin, and recitations. During the senior year opportunities will be given members to attend cases of obstetrics.

Text Books—Lusk.

Collateral Reading—Playfair, Galabin, Charpentier.

SURGERY

Lectures and recitations; also clinical instruction, and special courses in minor surgery, bandaging, and operative surgery.

Text Books—Wyeth and Bryant.

Collateral Reading—Agnew, Ashhurst's International Encyclopaedia, and Erichsen.

PRACTICE OF MEDICINE

Lectures, recitations and clinical instruction. Bedside instruction will be a special feature in the teaching of this branch.

Text Books—Hilton Fagge.

Collateral Reading—Flint, Reynold's System, Loomis, Niemeyer, and Roberts.

DISEASES OF WOMEN

Lectures, clinical instruction and attendance upon operations. The opportunities of practical instruction in this branch will be very ample.

Text Books—Thomas, Schroeder, Byford.

Collateral Reading—Emmett and Hart and Barbour.

EYE AND EAR

Lectures, clinical instruction, and recitations.

Text Books—Nettleship (eye), Roosa (ear), and Williams.

Collateral Reading—Juler, Stellweg, Soelberg Wells and Politzer (ear).

DISEASES OF THE NERVOUS SYSTEM

Lectures and clinical instruction. Special opportunities will be afforded students in differential diagnosis.

Text Books—Gower's Nervous System, Bramwell (Cord), and Folsom (Insanity).

Collateral Reading—Ranney's Applied Anatomy of the Nervous System, Hammond's Diseases of the Nervous System, Bastian's Paralysis, and Clouston's Mental Diseases.

GENITO-URINARY DISEASES

Lectures and Clinical Instruction.

Text Books—Thompson's Diseases of the Urinary Organs.

Collateral Reading—Vanburen and Keyes, and Bumstead and Taylor.

DISEASES OF CHILDREN

Lectures, didactic and clinical in their character, will be given under this chair.

Text Books—J. Lewis Smith, Eustace Smith, Meigs and Pepper, and Goodhart.

DISEASES OF THE SKIN

Lectures and clinical instruction.

Text Book—Duhring.

Collateral Reading—Hyde and Van Haslingen.

LARYNGOLOGY

Lectures and the use of the Laryngoscope. Clinical instruction.

Text Book—McKenzie.

Collateral Reading—Bosworth.

PHYSICAL DIAGNOSIS

Lectures, class exercises, bedside instruction.

Text Book—Loomis.

Collateral Reading—Bramwell (heart).

ORTHOPAEDIC SURGERY

Lectures and clinics.

Text Book—Rums (Practical Orthopaedia).

Collateral Reading—McNamara and Gibney.

HYGIENE

Lectures.

Text Book—Parks.

Collateral Reading—Richardson's Preventive Medicine, Buck's Hygiene.

MEDICAL JURISPRUDENCE

Lectures.

Text Book—Taylor's Manual, by Ruse, last edition.

Collateral Reading—Taylor's Principles and Practice of Medical Jurisprudence.

The roster of the faculty of the Department of Medicine in 1888 is a list of names of persons whom we must thank for setting the stage for the drama which has followed. The period from 1888 to 1913 was a sort of prologue to the play itself. The scene was set and the main actors ready to be introduced. In 1913 a new president of the University, Dr. George E. Vincent, put in motion a plan whose theme embodies the first act of the historical drama we are reviewing. President Vincent had a vision of a medical school which would be the center in which a group of scholars would devote their full energies and activities to forwarding scientific research and teaching in medicine, supported by an able group of appointees from the active medical profession in the community. In the president's report to the Board of Regents for 1913 appears an account of the actions which prepared the way for the reorganized plan put into effect that year.

To the President of the University:

Sir: As Acting Dean during the last part of the school year, 1912-13, I beg to present to you the report of the Medical School for the year ending July 31, 1913.

Faculty—The Faculty records with regret the death, on February 2, 1913, of one of its original members, Dr. Parks Ritchie, who filled the chair of Obstetrics for twenty-five years, and the deanship of the College from 1897 to 1906. His long and faithful service commands the gratitude of the University and gives his name a fitting place in the annals of medical education in this State.

The school has suffered serious misfortune in the retirement of Dr. Frank Fairchild Westbrook, who, on July 1, 1913, resigned the headship of the department which he had conducted for eighteen years, and the deanship which he had held for seven years, in order to accept the presidency of the University of British Columbia. His colleagues measure the enviable gain of the Canadian province by their sense of loss of his leaving, not only to the University of Minnesota, but to the interests of medical education and medical science in America. The vacancy he has left is no less keenly felt because his place has been fortunately filled.

On June 11, 1913, Elias Potter Lyon, Ph.D., M.D., was elected Dean of the Medical School to succeed Dean Westbrook, and was also appointed Director of the Department of Physiology. The scientific work that Dean Lyon has already done testifies to his ability as an investigator, and the satisfactory results of his deanship in the St. Louis University Medical School promise much for his skill as an administrator. The Faculty anticipates a new era of progress under his leadership.

Reorganization—In the spring of 1913 the Board of Regents directed the reorganization of the College of Medicine and Surgery and appointed a committee, consisting of three members of the Medical Faculty, Dr. F. F. Westbrook, Dr. Charles Lyman Greene, and Dr. James E. Moore, and of three alumni, Dr. Louis B. Wilson, Dr. Edward L. Tuohy, and Dr. Theodore Bratrud, charged with the duty of determining the principles of this reorganization. Their work, modified at certain points and approved by the President and by the Board of Regents may be briefly stated:

1. The title of the former College is changed to that of the Medical School.

2. The following titles, in ranking order, are established: (1) Professor and Chief (of clinical) or Director (of laboratory) Department; (2) Professor in charge of Division; (3) Associate Professor in charge of Division; (4) Associate Professor; (5) Assistant Professor; (6) Instructor; (7) Assistant.

3. Dr. C. Eugene Riggs, Dr. Thomas S. Roberts, and Dr. James T. Christison are named as Emeritus Professors.

4. The School is reorganized under eight departments, namely, the Department of Anatomy: Director, Clarence Martin Jackson, M.S., M.D.; the Department of Physiology: Director, Elias P. Lyon, Ph.D., M.D.; the Department of Pharmacology: Director, Arthur D. Hirschfelder, B.S., M.D.; the Department of Pathology and the Department of Bacteriology and Public Health (temporarily recombined): Acting Director, Dr. Harold E. Robertson, B.A., M.D.; the Department of Medicine: Chief, Charles Lyman Greene, M.D.; the Department of Surgery: Chief, James E. Moore, M.D.; the Department of Obstetrics: Chief, Jennings C. Litzenberg, B.S., M.D.; Diseases of the Eye, Ear, Nose, and Throat, Orthopedics, Dermatology, and Urology constitute Divisions of the Department of Surgery; Nervous and Mental Diseases and Pediatrics become Divisions of Medicine; and Gynecology is merged with Obstetrics and with Surgery.

5. The Faculty consists of eleven professors, eighteen associate professors, sixteen assistant professors, and twenty-five instructors; a total of seventy-one members, a substantial reduction from the former total of one hundred and eighty-four. Clinical and laboratory assistants, not accounted members of the Faculty, number thirty-two.

6. An Administrative Board, consisting of the President of the University, the Dean and the Secretary of the Medical School, the superintendent of hospitals, the directors or chiefs of departments, and of one member-elect from the Faculty at large, is charged with the immediate conduct of the affairs of the School. This body reports its official actions to the Faculty, which holds the privilege of review and advisory action.

7. Dr. R. O. Beard has been appointed Secretary of the Medical School. In addition to assisting the Dean in his administrative duties, he is given charge of the medical buildings and oversight of requisitions, of equipment and supply funds, and of the inventories of the School.

Respectfully submitted,

RICHARD OLDING BEARD, Secretary.

The reorganized school under its eight department directors cut the pattern which has been followed for the last twenty-five years. It was composed of a group of people who were qualified by training and experience to prosecute a program of scientific research and graduate education. There were many members of this group who had come to the University of Minnesota earlier and three new department heads were appointed in anatomy, physiology and pharmacology. At this time the program of graduate medical education which has become so large a part of the contribution of the University of Minnesota to medicine was begun. In the past twenty-five years some 1000 persons have been granted advanced degrees in the medical sciences by this University. The graduate teaching program in medicine has now become at least as important as the undergraduate one. During the past academic year there were about 450 students registered for work leading to the M.D. degree and about 600 working for graduate degrees in the medical sciences.

In working out this program, the leaders in the medical school seemed to foresee the increasing importance which intensive training in a branch of medical science would have. Today with the advent of special requirements for the practice of specialties, with the great need for trained investigators and teachers to carry on the forward work, it is much easier for us to see the wisdom in their plan. Many important centers of medical education are today embarking on programs begun at the University of Minnesota in 1913. There could be no

more striking testimony to the soundness of the early Minnesota plan than has appeared in the course that events have taken in medicine during the last quarter century.

The University of Minnesota Medical School has been first in another forward step. Beginning with those persons receiving their M.D. degrees in 1916, a fifth, or internship year, was made a requirement for that degree. Recognizing that the increase in scientific content of medical education both forced clinical teaching out of the early years of the medical course and added to the desirable content of the clinical courses, it became necessary to extend practical clinical work beyond the conventional four years of the medical course. Thus could physicians be better prepared scientifically without being more poorly prepared practically. There are many flaws in internship training. Outside of teaching centers there is frequently too little attention paid to the teaching aspects of an internship. There are, of course, many notable exceptions to this rule. In spite of the poor quality, however, of a certain number of internships, the establishment of the tradition that Minnesota graduates in medicine shall serve a sort of practical apprenticeship after their more formal training is completed, has served to raise the quality of medical practice in this region.

In order to visualize the changes which have taken place in the method of educating physicians, it is of interest to compare the requirements for admission and other details of the educational program at the University of Minnesota today with the situation evident from the description of 1888. Some excerpts from the 1939 *Bulletin* of the Medical School follow.

REQUIREMENTS FOR ADMISSION

The minimum requirements for admission to the Medical School are three full years of work in colleges approved by the Association of American Universities, and including the specific courses listed below.

A candidate's record must show a total number of honor points at least equal to the total number of credits both in the required subjects and in all subjects taken collectively. This is equivalent to a "C" average in the usual marking systems.

Mere fulfillment of the minimum scholastic requirements does not in itself insure admission to the Medical School.

DETAILS OF REQUIREMENTS

1. *Chemistry*.—Thirty-two credits including general inorganic chemistry, qualitative and quantitative analysis, organic and physical chemistry, with laboratory work.

2. *Zoology*.—Thirteen credits, including proper laboratory work.

3. *Physics*.—Twelve credits, covering mechanics, acoustics, heat, optics, and electricity.

4. *Rhetoric*.—Nine credits. No student found deficient in the use of written or spoken English will be permitted to enter upon or to continue in the medical course.

5. *Psychology*.—Six credits of general psychology.

10. *Academic degree*.—The degree of bachelor of arts or bachelor of science must be acquired by all medical students before registering for the junior year.

RECOMMENDED PREMEDICAL WORK

While it is possible to secure admission to the Medical School after the minimum amount of prescribed college work has been completed, the applicant is urged to prepare himself more fully by the study of some of the following subjects.

Sociology (especially Social Pathology), zoology (Introduction to Animal Parasitology), agricultural biochemistry, anthropology, astronomy, botany, composition, drawing, economics, English, geography, geology, history, mathematics, personal

health, philosophy, physics, political science, psychology and speech.

A list of recommended courses is available in the dean's office. Four years of premedical study are desirable; the work should be planned so as to lead to an academic degree if four years are taken.

The curriculum in liberal arts intended for those who wish to get a broader view of the fields of knowledge ("second curriculum" in the bulletin of the College of Science, Literature, and the Arts) is recommended to premedical students who wish to secure an academic degree without majoring in a special field.

CURRICULUM

CURRICULUM FOR THE DEGREE OF BACHELOR OF MEDICINE

Optional Courses of Study

Candidates may:

- a. Pursue the regular curriculum outlined below, or
- b. Follow the regular curriculum with modifications in the direction of special work in some particular department. Such students with the written consent of the dean of the Medical School may register during certain quarters in the Graduate School; and such registration, if major work is done in a Medical School department, may be transferred later to the Medical School to count toward a medical degree. Such students may qualify for advanced degrees such as M.S. and Ph.D.

REGULAR CURRICULUM

<i>Departmental Hours</i>	Clock Hours
Anatomy, gross and microscopic	693
Bacteriology	176
Medicine	987
Obstetrics	411
Ophthalmology and Otolaryngology	108
Pathology	396
Pediatrics	330
Pharmacology	176
Physiology, including Physiological Chemistry and Biophysics	462
Preventive Medicine and Public Health	86
Roentgenology	59
Surgery	581
Total	4,465

It will be noted that in place of the dubiously worded requirement of a high school diploma in 1888, at the present time a prospective medical student must present evidence of completion of at least three years work of approved collegiate grade including both a certain minimum of scientific background in physics, chemistry and biology, and also a fair background in the more conventional liberal arts courses with emphasis upon sociology, history and languages.

Just as 50 years ago the University of Minnesota was taking the lead in setting up improved standards of scientific qualification, so at the present time this University, among others, is attempting to arrange its curriculum in such a way, that its graduates in medicine will be cultured persons in a broad sense, as well as highly trained students of medicine. The era of specialization has shown the undesirability of confining college training for premedical students to the strictly technical prerequisites in the sciences. In order to maintain the position of the profession of medicine in the high place in the community which it holds, it is essential that physicians understand as well as other cultured people the complex problems which our urban and industrial civili-

zations have thrust upon us. Such an understanding requires a breadth of training and is perhaps the main reason why increasing the years of premedical study from two to three has been found to be desirable.

The Medical School of the University of Minnesota has been supported largely by state appropriations, but the extent to which it has been assisted by private grants is not generally known. Actually a total of more than \$4,500,000 has come in special gifts. Chief among these have been the following special gifts: from the wife of Dr. Adolphus E. Elliot, a gift for the construction of the Elliot Memorial Hospital; from William Henry Eustis a gift for the construction and endowment of a Children's Hospital and Convalescent Home; from the Citizens Aid Society a gift for the construction, equipment and operation of the Cancer Institute; from the widow of Dr. Frank C. Todd, from Mrs. E. C. Gale and from Mrs. L. E. Mapes a gift for the construction of the Todd Memorial Eye, Ear, Nose and Throat Hospital; from the James E. Moore and Howard Baker estates funds for use in the Department of Surgery; from the estate of Dr. George G. Eitel a fund which will become available as a loan fund for medical students; from the trustees of the Stevens Avenue Home for Children and Aged Women a grant for the operation of the Psychiatric Clinic for Children in addition to a grant from the Commonwealth Fund; from Mr. and Mrs. Hayden S. Cole a gift for the establishment of fellowships in Orthopedic Surgery; from the Barber Oil Company a gift for research in cancer; from Mrs. John Dwan a gift for the establishment of a Human Serum Laboratory; from the Commonwealth Fund a grant for the support of Postgraduate Medical Education; from the Rockefeller Foundation a grant for research in physiology; and from the Carnegie Institute of Washington a grant for research on viruses.

The larger share of the clinical facilities on the university campus have been provided out of private funds. These benefactions all constitute investments which public-minded citizens have made for the welfare of mankind.

The important contributions of the medical school are written in two ledgers. In the one, appear its achievements in the training of men and women to render practical medical service to the community. In the other, appear the contributions to the permanent fund of basic knowledge which represents the advance of a stable sort. On both of these ledgers, the University of Minnesota has written a good account. Its more than three thousand graduates have served their generations well, both in the rendering of practical service and in the promotion of knowledge. It would be impossible to list the specific research accomplishments, but in such widely diversified fields as growth and intestinal obstruction, as sewage disposal and vitamin research, the University of Minnesota has left lasting contributions from its first fifty years of service, contributions, the value of which has already exceeded by many times the whole cost of the medical school, and the dividends from which will continue to return as long as the human race shall live.

II. The Scientific Program of the Semi-Centennial Celebration

In planning the scientific program the committee in charge chose a theme which they believed would symbolize the advance of medicine over the past fifty years and would point the way that progress may be expected to take in the immediate future. Among the several general themes which might obviously suggest themselves,

the topic, "Some Trends in Medical Progress with Particular Reference to Chemistry in Medicine," was chosen. Fifteen papers bearing on this general topic were presented on October 12 and 13, 1939.

In addition, on October 14, six anniversary clinics were presented by members of the staff of the University of Minnesota, at the Mayo Foundation and in the Medical School at the University.

Abstracts of the scientific papers follow.

A. PROGRESS IN THE APPLICATION OF PHYSICAL CHEMISTRY TO MEDICINE

Presiding: GEORGE E. FAHR

Professor of Medicine, University of Minnesota

Colloid Chemistry of Membranes in Living Organisms

HERBERT M. FREUNDLICH

Distinguished Service Professor, University of Minnesota

Dr. Freundlich pointed out the important role that membranes play in biological processes and stated that, for the most part, physical chemists had been only slightly interested in membranes. This is probably true because membranes introduce annoying complications in physical chemical systems.

"Membranes set up barriers. In a limiting case they may be strictly semipermeable, allowing the solvent to pass, but preventing the solute from doing so. Very many intermediate cases, however, are possible and known. If a membrane separates two solutions containing substances which would react with each other, it prevents the straightforward reaction that would go on in a homogeneous solution and it may cause an involved series of processes depending on the special permeability of the membrane. This permeability may be very complex: all substances present may be able to pass the membrane, but with very different velocities; the membrane may be asymmetrical, allowing a substance to pass easily from the one side, difficultly from the other; or it may be permeable to cations from the one side, to anions from the other, etc. This complex behavior is fully realized by biologists, when treating natural membranes."

Professor Freundlich discussed the mechanism of abnormal osmosis, that is the movement of water as a result of other forces than simple passive osmosis. He described electrochemical phenomena which are capable of producing such movement as a consequence of the existence of concentration gradients of salts on the two sides of membranes which are made up of pores of different characteristics. The latter type of membrane is referred to as a mosaic. The simple diameter of a pore in the membrane is able to determine, other things being equal, what materials may pass through. Very small pores with an electric charge on their walls permit ions of only one sign to pass. This restriction to passage for ions of the same sign sets up large electrical forces which are able to do work.

Professor Freundlich also discussed other types of abnormal osmosis. "With membranes that are able to swell, abnormal and particularly negative osmosis may be produced by an other mechanism, namely by differences in the rate of swelling, as was shown by Flusin. If a rubber membrane separates two liquids in which it swells with different velocity, e. g. benzene and alcohol, the liquid is transported osmotically through the membrane from that side of the latter which swells more quickly, i. e. from the benzene side. In these experiments the rubber

membrane must be prevented from bulging out by pressing it between two nettings of this wire. The same holds, if we are dealing with a membrane like pig's bladder between water and an aqueous solution: if the aqueous solution, e. g. one of tartaric acid, causes the membrane to swell more quickly than in water, the transport liquid goes from the acid solution to the pure water, i. e. we have a negative osmosis. This behavior of pig's bladder between water and an aqueous solution of an organic acid was already observed by Dutrochet. This phenomenon has not yet been investigated very thoroughly. In particular, only Bartell seems to have discussed the question, how the behavior of membranes that are able to swell may be correlated to that of non-swelling membranes as it was treated above.

Finally, another group of phenomena may be briefly discussed, which are also able to cause a special distribution of substances across a membrane differing from that produced by normal osmosis. They are not bound strictly to the presence of membranes, but they are strongly enhanced by them.

We may start from the simple Donnan equilibrium: a solution of a colloidal electrolyte, i. e. of an electrolyte having one very large ion, like congo red, on the one side of a membrane which is impermeable to the colloidal ion, and a true solution, like one of NaCl, on the other side. In equilibrium the NaCl is not distributed equally on both sides; the presence of the colloidal ion allows only a comparatively small amount of NaCl to pass to the other side. This Donnan effect is an example of a very general phenomenon, as was emphasized first by G. Spencer Hartley. If a liquid solution is in a field of force which is not uniform, the dissolved substance does not remain in uniform distribution throughout the liquid, but also becomes distributed non-uniformly. We need not be dealing with a state of equilibrium; it also may be a stationary state or a temporary state only kept up, as long as the gradient of force is sufficiently steep. The simplest phenomenon of this kind is perhaps the Ludwig Soret effect: If a column of a solution, having at the outset a uniform concentration, is kept warm on the one end, cold on the other, the concentration of solute on the warm end becomes different from that on the cold end. It was believed that this phenomenon could be explained simply by van't Hoff's conception of solutions. Assuming that the osmotic pressure would have to be equal throughout the column, one might expect that the increase of osmotic pressure caused by the higher temperature would be compensated by a corresponding decrease in concentration. This theory, however, did not agree with the experiments. Not only the molecules of the solute migrate under the influence of the temperature gradient, but also the molecules of the solvent. The process depends on their mutual affinity, and it is, therefore, correlated in a still

unknown way to the solubility of the solute and the temperature coefficient of its solubility.

At constant temperature, the presence of a second substance which is not uniformly distributed, but which has a concentration gradient, is sufficient to produce a non-uniform field of force. The concentration gradient of the second solute causes an unequal distribution of the first solute, which originally was uniformly distributed. This phenomenon is known as anomalous diffusion or 'diffusion retrograde'."

Professor Freundlich closed his paper with the following thoughts. "It is distinctive of life that it is a stationary state of chemical and physico-chemical processes at a distance from equilibrium. Life is also, as it were, a very long, if we consider propagation, a practically eternal interlude. Membranes favor interludes strongly interrupting the straightforward course of reactions. It is another characteristic feature of biological processes that they do not occur, as a rule, in homogeneous solutions, but that chemical reactions are of necessity closely correlated to the existence of a special structure in space. Membranes favor a particular distribution of substances in space, they underline, so to say, a geometrical factor. These facts form perhaps the essential part of the influence which membranes bring to bear upon biological processes."

The Performance of Osmotic Work in Living Systems

MAURICE B. VISSCHER

Professor of Physiology, University of Minnesota

Living systems may be described from a physico-chemical point of view as systems maintained at a steady state at positions far from true equilibrium. The physiologist, Claude Bernard, recognized this fact when he stated the law of constancy of the *milieu interieur* or internal environment as a condition of life. Cannon's concept of homeostasis puts the same idea forward as a unifying principle in physiology.

In chemical systems such as one finds in a living organism, the maintenance of a steady state at some distance from the position of true reversible equilibrium can be accomplished only by the continuous expenditure of energy. There are many aspects of the problem of steady states important to biology but I shall confine myself strictly to observations concerning the osmotic activity of living systems.

In order to point out that osmotic work is of more than academic interest I shall mention briefly some applications. From a medical point of view the most conspicuous example is the secretion of urine. The kidney has the largest responsibility for maintaining osmotic constancy in mammalian forms. In lower vertebrate forms, as Keys has shown, this function is handled mainly by certain specialized structures in the gills. In mammals, the kidney is capable of concentrating substances a hundredfold in urine as compared with blood, and it can secrete urine with an osmotic pressure as much as twenty atmospheres greater than that of plasma. Moreover, it is the concentration of individual constituents rather than the over-all osmotic pressure which is of the highest importance.

The selectivity with which the kidney does work must be emphasized. From a practical point of view the clinician is mainly interested in the pathological physiology of the kidney, and is therefore concerned with those conditions in which the kidney fails to do selective osmotic work in a normal manner. Analyzed broadly in physico-chemical terms a renal insufficiency constitutes such a failure. Specifically this defect may result from the anatomical destruction of certain units, or it may be the result of chemical changes in the cells of the kidney tubules which leave no visible microscopic sign.

It might seem to be of no great consequence to know that when a large proportion of glomerular and tubular units in a

kidney are destroyed, as in glomerulo-nephritis, the essential functional pathology is in the osmotic work mechanism. It might seem that since the damage is obviously structural in a microscopic or even a gross anatomic sense, the resultant functional defect would be so obvious as not to require study. Actually, however, this is not true. The kidney, like other organs, has a large margin of safety in its capacity to do work, and a large fraction, even a major portion, of its mass can be destroyed or removed without impairment of function except under extreme conditions. It is the business of the physician to assess the degree of functional damage by studying the limits of capacity to do osmotic work and to govern the treatment of his patient accordingly. Every renal function test represents fundamentally a measure of the ability of the renal mechanism to perform osmotic work. The dilution-concentration tests, the various clearance measurements and the dye excretion methods, all involve estimations of the ability to do certain types of osmotic work.

In other disease states the ability of the kidney to do osmotic work is impaired without obvious renal histo-pathology, as for example in adrenal cortical insufficiency, where the concentrating power of the kidney tubules for numerous urinary constituents is much reduced. The defect of the kidney tubules in this disease may be shared by other cells in the body, for all active cells probably do work to maintain the normal distribution ratios between intra and extra cellular fluids. It is not impossible that in adrenal insufficiency the body cells generally are less able to do the osmotic work by which they maintain their individual chemical characteristics.

Over the last several years, my research associates and I have been engaged in investigations concerning the circumstances surrounding the performance of osmotic work in living systems. We have studied a number of gland secretory processes and the maintenance of concentration differences between cells and tissue fluids, but we have devoted our main attention to absorption from the intestine. Intestinal absorption has in the past been considered generally to involve mainly passive processes, but it is now obvious that, although passive processes also take place, a very important part of intestinal absorption occurs against concentration gradients and that osmotic work is done in such movement.

The lower ileum can be made to do osmotic work which is qualitatively and quantitatively somewhat similar to that done by the renal tubules. The intestine offers important advantages for investigation over the kidney tubule because it is a macroscopic rather than a microscopic organ and therefore lends itself better to investigation. Although the mechanism by which the intestine performs osmotic work is important in its own right, the main objective of our studies has been to discover whatever empirical regularities may be found with the expectation that the fundamental mechanisms are apt to be similar in comparable situations elsewhere in living systems.

We have studied in detail concentration and volume changes in active absorption. Complete balances have been calculated in order to eliminate the possibility of simple ion exchanges. The influences of numerous factors, such as H⁺ anesthetics and poisons, species of animal and level of the small intestine have all been studied. The movement of water has been investigated by the use of D₂O, by the study of total osmotic activity, as well as by volume measurements. We have determined the hydrostatic pressures in the gut during absorption to rule out simple filtration processes. The absorption of the animal's blood serum introduced into the intestinal loop has been studied in order to set up conditions in which all concentrations are identical on the blood and intestinal lumen sides of the gut wall. The absorption of a wide variety of substances moving both against and with diffusion gradients has been studied.

The main results of this work show that in the presence of di-valent ion salts such as sodium sulfate, the simple uni-valent ion salts such as sodium chloride are moved out of the intestine against concentration gradients, a phenomenon which could not occur without the performance of work. It has been shown that during absorption from the intestine, fluid enters it from the blood even while fluid is also leaving to the blood. Various studies have shown the probable existence of what has been called the fluid circuit which is driven by some force which has not been identified. In this movement fluid moves through at least two membranes the permeability characteristics of which can account for the distribution of materials which is observed. The existence of such fluid circuits has been shown to occur in other living systems. For example, protozoans such as *Amoeba proteus*, and *Paramecium caudatum* rhythmically discharge from their contractile vacuoles quantities of fluid equal to as much as their cell volume in one hour. This process occurs continuously throughout the life of the organisms. As they do not lose volume it is obvious that an equal quantity of fluid is entering the organisms through other parts of the cell surface. Krogh (1939) concludes that nearly pure water must be excreted by the vacuole. The work that must be done by these organisms can readily be calculated, and it is found to be very large. The ability to perform such work has been found to be abolished by cyanide. According to Müller and others this process serves an osmoregulatory function.

It is not germane to my argument to insist upon the mechanism by which the contractile vacuole operates. I am content to rest on the simple observation that quantities of fluid equal to the volume of the entire organism pass from the external medium into the cell and out again through the vacuole as rapidly as once per hour. Here is obviously a fluid circuit in a very simple system. If osmotic work is done in the process the situation approximates the one under consideration in mammals even more closely, but that point is not crucial.

I should like to refer to another system in which osmotic work is known to be done and a kind of fluid circuit is known to exist, although in its simplest form it is not known to do all of the osmotic work. I refer to the vertebrate kidney itself. We know, on the basis of the work of numerous investigators, that a large volume of fluid is filtered through the glomerular capsules, a quantity about equal to the entire blood volume every hour. Ordinarily 99 per cent of this fluid returns to the blood in the course of its passage along the renal tubules. The high concentration of such substances as urea and creatinine in the urine is generally conceived to be due to the impermeability of the tubular epithelium to these substances. The reason for such impermeability and the mechanism by which the water is returned to the blood are unsolved problems, but the fact of a fluid circulation equal in volume to about a hundred times the eventual urine volume is not open to serious question.

It would not be strange if one were to find this mechanism, seen in the case of the most primitive animal forms and in the most highly specialized organ, present in nature for the performance of selective osmotic work, employed generally in accomplishing such work.

At the present time any such theory must be entirely tentative, in spite of the fact that by its application one can account for a number of otherwise inexplicable facts. A theoretical approach is nevertheless extremely desirable regardless of how tentative it must be, because only the most random kind of exploration is possible without some theoretical thesis to test. A reasonable groundwork of hypothesis in any science spares workers in that science from being mere "pebble pickers," as some prominent critics of the scientific method have called them. Reasonable theories give point to investigation just as long as hypothesis is in accord with fact. When clear contradictions exist the hypothesis must be abandoned or altered.

Nowhere, perhaps, more than in the problem of the mechanism of performance of osmotic work is a theoretical background necessary to progress. The *a priori* possibilities of mechanisms are extremely numerous, but the mechanisms which are compatible with known fact are few. It is inevitable that by setting up critical experiments testing these several possible mechanisms progress can be made toward the more complete solution of this fundamental problem.

Some Reactions by Which Solutes May Be Differentially Concentrated by the Kidney

JOHN P. PETERS

Professor of Medicine, Yale University

Dr. Peters began his discussion with some observations on unexpected peculiarities in the distribution of substances between the red blood cells and the plasma and between protein containing solutions and their ultrafiltrates.

"The red blood cells lend themselves to a study of this process because they can be separated from their environment, the plasma, so that the compositions of both media can be determined by direct analysis. All of you are familiar with the striking differences between them. Proteins are more concentrated within the cell; only glucose, urea and other neutral organic solutes of small molecular size are evenly distributed. Potassium is the chief inorganic base in the cells, sodium in the serum; calcium is almost excluded from the cells which contain more magnesium than the serum. Bicarbonate and chloride are far more concentrated in serum than cells; the cells contain large quantities of organic phosphate esters that are almost entirely lacking in serum. In the test tube, so long as the cells are properly treated, it is impossible to alter their composition by adding the most diverse inorganic solutions. They respond merely by exchanges of water, so regulated that the osmotic pressures on the two sides of the membrane remain always identical. This has been demonstrated by additions to the blood of water and of carbonates, chlorides, sulfates and phosphates of both sodium and potassium. Such experiments have been cited as evidence that the membranes of the red blood cells are impermeable to inorganic bases and to most acids. From indirect evidence of various kinds it has been deduced that most of the cells in the body behave in a similar manner. It is quite obvious, however, that if cells are to function they must have access to the materials essential to their activities, among which belong potassium, magnesium and phosphate. Their impermeability to these elements must, therefore, be conditions.

When experiments similar to those just described were attempted *in vivo* by examining the blood of patients before and after the administration of large amounts of hypertonic salt solutions, a peculiar paradox presented itself. Again the volumes of the red blood cells varied directly in proportion to the base of serum. On the other hand, chemical analyses revealed unmistakably that the base in the cells had changed. In the circulating blood in the living subject, then, the impermeability of the cell envelope to base is not absolute. Moreover, base can enter or leave the cell without, apparently, altering osmotic pressure. This base must be osmotically inactive. Now there were certain facts that might have led us to anticipate this paradox. In the first place it had been discovered that the correlation between water and base in cells was extremely rough. In the second place the correlation between the concentrations of base in serum and cells was also poor, the base in the latter being far more variable. In connection with other cells it had been demonstrated by Harrison and Darrow that after adrenalectomy the cells retained or took on potassium without an equivalent amount of water. Nevertheless, in this condition the cells responded in the usual manner to changes of the osmotic pressure and base concentrations of serum. It was recognized

that potassium, magnesium, inorganic phosphate and organic phosphate esters played particular individual roles in the metabolic activities of the cells. This suggested that they had certain selective chemical affinities. Magnesium and phosphate esters performed their functions by chemical reactions in which certain proteins participated as coenzymes. It was reasonable to suppose, then, that these inorganic components and proteins formed combinations in the course of the reactions.

The problems which confronted us at this point were: first, to find conditions by which base could be driven across the red blood cell membrane in the test tube; second to ascertain the state—or, if you will, activity—of the inorganic components of the cells. In neither effort have we been entirely successful, but we have some suggestive results. In describing the *in vitro* experiments above I was careful to state that the red cells, if properly treated, were impervious to bases and to the acids enumerated. Proper treatment consisted of keeping them in the cold for purposes of preservation. Of course this also held metabolic processes in abeyance. With this thought in view Dr. Lena Halpern tested the reactions of the cells at incubator temperature, studying, however, the behavior of inorganic phosphate rather than base. She discovered that although, at refrigerator temperature, no inorganic phosphate could be driven across the membrane in either direction by extreme alterations of its concentration in serum, at incubator temperature the inorganic phosphate derived from hydrolysis of organic esters poured out of the cells even against a concentration gradient produced by the addition of inorganic phosphate to the serum. Obviously the cell membrane was not dead or such concentration gradients would not be maintained. But to make assurance doubly sure it was proved that the current of inorganic phosphate could be reversed by the addition to the system of glucose, which also reversed the direction of the metabolic processes, causing phosphate esters to be reformed at the expense of inorganic phosphate.

These facts are interesting enough, but it is certain of their implications that I wish to emphasize. When this cell was at rest in the cold it acted like a perfectly inert osmometer, impervious to all the substances that give it its specialized properties, responding passively to osmotic changes in its environment by taking on or giving up water. But how could it do otherwise and maintain its integrity without the expenditure of energy? The mere maintenance of differentiation, in the absence of the mysterious restraints that we label impermeability, would be an impossibility without continuous work. When

metabolic activity begins it brings with it demands for new materials and changes in the chemical internal environment; but it also provides the energy by which these changes can be effected without dissolution of that environment. Phosphates could move across that red cell membrane, when the cell was active, against the force of osmotic pressure. They were secreted by the cell, presumably by the force engendered by these metabolic activities."

In connection with the work of concentration by the kidney, Doctor Peters called attention to an important fact, that the most important aspect of the work of the kidney is in the differential concentration of various separate substances. The work that is represented simply by the difference in osmotic pressure or the depression of freezing point of urine as compared with blood, is not by any means an adequate measure of the work the kidney does. Each individual constituent must be taken into account in order to measure such work. Doctor Peters described experiments in which the excretion of sulfate in the urine was studied after intravenous injection of solutions of various sulfates. The results showed a surprising dependence of the rate of excretion upon the concentration in the plasma. It was pointed out that although sulfate was ordinarily classed as a non-threshold substance, in reality it is not. He distinguishes between exogenous and endogenous sulfates.

"The important fact is that, if exogenous sulfate enters the serum, as its concentration in the serum rises the excess of sulfate is excreted far more rapidly than is the native or endogenous sulfate, and apparently according to a different principle. The rate of excretion of the extra sulfate bears a definite relation to its concentration in the serum. Whether endogenous excesses of sulfate would be treated in the same way is difficult, if not impossible, to determine because the breaks in the clearance curves occur at serum concentrations that are encountered in life not at all or only when renal function is profoundly impaired. The temptation is strong to conjecture that the sharp breaks in the directions of the clearance curves are determined not by some critical concentration of sulfate in the serum, but by the fact that sulfate in some unusual form has gained access to the tubular urine. The subject takes on more importance in the light of other experiments which indicate that phosphate, chloride, sodium, potassium, calcium and magnesium can all be shown to behave in a similar manner if the experimental stage is so set that confusing factors are excluded."

B. SOME RECENT ADVANCES IN METABOLISM

Presiding: CLARENCE M. JACKSON

Professor of Anatomy, University of Minnesota

Organic Chemistry in the Pursuit of Vitamin Research

LEE I. SMITH

*Professor of Organic Chemistry
University of Minnesota*

Dr. Smith pointed out that in the field of vitamins and hormones, one is dealing with chemical substances which exert profound biological effects by their presence in very minute amounts. These substances might be called "bio-catalysts." The problem in vitamin research is that of discovering, by means of carefully controlled experiments, the nature of a substance which is causing a given effect by its presence in extremely small amounts. Since such substances are organic in nature, and their effects are biological, it requires the combined efforts of biologists and chemists to solve the problems involved. In no other field perhaps has there been such an absolute necessity for coöperative efforts in research. Stages in the study and elucidation of the nature of a vitamin and of its biological actions according to Dr. Smith may be counted roughly as five. There are: (1) Recognizing a biological effect which can be traced to a lack of something in the "high purified" diet used. (2) Using a process of selective elimination, the substance whose lack is responsible for the biological effect is located in one or more of the dietary components, and a foodstuff is sought which is particularly rich in the unknown substance. The foodstuff rich in the unknown is processed in various ways and concentrates are obtained. Frequently studies made with active concentrates yield a great deal of information about the substance chemically. (3) Physical and chemical methods are used to study the concentrates, and a criterion is sought by means of which the active substance may be determined rapidly without waiting for the bio assays. Concentrates are further worked over, and very active ones finally obtained. The active substance is finally isolated and its composition established by analysis. (4) Methods of organic chemistry are next applied to determine the character of the substance and to synthesize it. (5) The final stage may be said to be endless; it consists in a further chemical search for substances with the same action, and physiological and clinical studies of its mode of action.

Dr. Smith recalled the history of vitamin E research. In 1922, Evans and Bishop at California, described the results of a series of experiments which indicated that there was hitherto an unknown dietary constituent necessary for normal reproduction. This was seen as a new vitamin, and at first there was some hesitancy in accepting another member of the vitamin family. But from various laboratories came convincing evidence, and it was soon well established that rats, reared on diets otherwise complete, but not containing this new fat soluble factor, did not have offspring although they appeared quite normal in other respects. Male animals became sterile through degeneration of the germinal epithelium, and this damage was irreparable. Females failed to carry their young to term; the embryos died and were absorbed, but the female reproductive mechanism as such was not permanently damaged since adequate doses of the missing factor restored fertility. However, over long periods of time there is some permanent damage to the female organism. Still other experiments showed that diets in which this factor, though originally present, had been destroyed by oxidation, were likewise inadequate for reproduction. And so the substance X became vitamin E.

In looking for a source of vitamin E, various foods were tested, and wheat germ oil was found to be richest as a source, but from about 10 Kg. of dried wheat germs one gets about 1 Kg. of oil, and from this amount a maximum of 1 Gm. of pure vitamin E can be obtained. The isolation is very laborious; in the final stages it is accomplished by treating the concentrates with isocyanic acid, HNCO, thereby the hydroxyl group of the vitamin reacts to form an allophanate; $2\text{HNCO} + \text{ROH} = \text{H}_2\text{NCONHCOOR}$. The allophanate is purified by crystallization, and then the hydroxyl compound is regenerated by alkaline hydrolysis.

One of the first points to be discovered in the chemistry of vitamin E was its ready susceptibility to oxidation and its association with antioxidants in nature. Substances high in anti-oxidant power were found to be also high in vitamin E content. Acetylation or benzylation of vitamin E concentrates did not destroy the vitamin activity but did destroy the antioxidant action. These facts, together with the formation of an allophanate, indicated clearly that there was one hydroxyl group in the vitamin molecule. Further investigation showed also that not one, but three distinct substances possessed vitamin E activity. These individual substances were called tocopherols and were designated as alpha, beta and gamma. Careful purification of the allophanate of alpha-tocopherol, followed by regeneration of the vitamin, led to a yellow oil having the composition $\text{C}_{29}\text{H}_{50}\text{O}_2$. Since this composition resembles very much that of some sterols, one of the first methods of attack on the structure of the vitamin was to dehydrogenate it with selenium. The result of this was a crystalline sublimate, tetramethylquinone. When the vitamin was heated alone, it decomposed and again a crystalline sublimate resulted, this time tetramethyl hydroquinone.

On the basis of these results, it was first thought that alpha-tocopherol was a mono ether of hydrodiquinone, but model experiments with mono ethers of known structure soon disproved this. By oxidation of alpha-tocopherol with chromic acid, Fernholz, in a brilliant piece of work, was able to isolate all of the oxidation products and from the structure of these, he deduced the correct structure for alpha-tocopherol. The substance is a chroman, specifically 2.5.7.8-tetramethyl-2-hexadecyl-6-hydroxychroman, in which the hexadecyl group is made up of three "isoprene" units joined head to tail. It thus really is a mono ether of a hydroquinone, but of a peculiar type. Since the benzene ring carries three methyl groups, this part of the molecule accounts for nine carbon atoms; the remaining 20 carbon atoms of the molecule were arranged as isoprene units joined head to tail. Now there occurs in nature an alcohol made up this way; it is phytol, the alcohol of chlorophyll. It was natural, therefore, to try condensing trimethyl-hydroquinone with phytol in the hope of effecting a synthesis of alpha-tocopherol. The synthesis was successful; in fact, it was astonishingly easy and alpha-tocopherol was made not only from phytol, but from phytylbromide and chloride, as well as phytadiene, by condensing any of these substances with trimethyl hydroquinone. At first there were some differences of opinion as to whether the heterocyclic ring in tocopherol was a ring of 5- or 6- atoms, but model experiments, both on the synthetic and degradative side, soon showed that the 6-membered ring was present, and that the original structure written by Fernholz was correct. Beta- and gamma-tocopherols have similar structures; they differ from alpha-tocopherol only in that one less methyl group is held by the benzene ring in beta- and gamma-tocopherols.

During the model experiments on the synthesis and proof of structure of alpha-tocopherol, a great many rather simple analogs were made. Surprisingly, many of these—some 40 out of over 130 tested—showed some vitamin E activity. Thus, the case of vitamin E is unique among the vitamins in that the activity is not specifically confined to any one compound, or class of compounds. The recent work in the field of vitamin K has shown that the specificity of this vitamin, too, is not limited to the vitamin itself.

The work on vitamin E has now entered the fifth stage. On the chemical side, experimentation is at present directed toward new and better syntheses for the tocopherols, and an extensive investigation of simpler compounds is underway. It is hoped that these investigations will lead to positive results with cheaper and more readily accessible compounds, and that the limits of vitamin E activity can sooner or later be correlated with chemical structure in some way so as to give a clue as to how the vitamin exerts its biological effect. On the clinical side, synthetic alpha-tocopherol is now available in some quantity, and with it, carefully controlled experiments can be made using a potent preparation of known purity. Vitamin E appears to be a promising substance to be used in the treatment of habitual abortion in women, and for similar use in the veterinary field.

Investigations of Metabolism of the Fatty Acids

GEORGE O. BURR

*Professor of Physiological Chemistry
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For almost one hundred years it has been recognized that animals can produce fats from other foods, especially carbohydrates. Although some authorities have believed that this power of synthesis is adequate for all needs, others have been equally positive that there are limitations, making necessary the inclusion of fats in the diet if health is to be maintained. Only during the last decade have definite experimental proofs been given that (1) there is a minimum fat intake without which certain animals cannot live and (2) much larger amounts of fat are required for the best health and optimum metabolism. These effects are due to fat per se and are in addition to the well known benefits of the fat-soluble vitamins which are concentrated in fatty foods. The vitamins will not be included in this discussion.

DIGESTIBILITY OF FATS

The first limiting qualities of any food are palatability and digestibility. Fresh, non-rancid fats are readily eaten and highly digestible, except when they are too hard. All edible fats which melt below 45° C (8° above body temperature) are easily digested, some measurements reaching 99 per cent in both rats and human beings. Stearic acid alone is very poorly absorbed, but when taken with liquid fatty acids of a mixed glyceride it is largely utilized.

Fatty acids may be fed as glycerides (natural fats), ethyl methyl or glycol esters, soaps, or the free acids. Free acids are likely to irritate the mouth and are therefore less palatable. Glycerides seem to have the highest food value of all the forms.

THE SHORT CHAIN ACIDS (Low Molecular Weight)

Over 90 per cent of food fats are made of acids with 16 and 18 carbons. Butter and coconut oil are rich in acids with 4 to 14 carbons. Their high food value proves the ready utilization of these acids when used in a mixed fat and in moderate amounts. Only when the pure acids are used in excessive amounts do toxic effects become evident. Butyric and lauric acids have been especially mentioned by workers dealing with toxic levels.

Animal fats are almost devoid of fatty acids with less than 14 carbons (myristic). This is due to the fact that animals do not synthesize the shorter acids, nor do they readily deposit such acids from food fats. Acids with 4, 6, and 8 carbon cannot be deposited at all. Only by starvation and forced feeding can much of the 10 and 12 carbon acids be put into body fat. The shorter acids burn readily and seem to be used to some extent in the synthesis of longer chains.

All natural fats are made of acids with even carbon numbers, 4 to 24. Synthetic acids with odd numbers are as readily burned as the natural ones and support growth of animals as well. The chief difference that has been noted is that the odd carbon acids are not ketogenic. The natural acids burn in units of two and four carbons, some of them appearing as ketone bodies in the urine under certain conditions. The three carbon residue of the odd carbon acids can be quantitatively connected to glucose or glycogen and appear to have strong anti-ketogenic action.

EFFECTS OF UNSATURATION

Higher animals synthesize a fairly hard and saturated fat from carbohydrate. But when large amounts of unsaturated liquid oils are fed, these are deposited in the tissues in sufficient quantity to render the body fat soft and oily. In pigs this produces so-called "soft pork." From studies with rats and calves it seems that too much of such an oil can be fed for the good of the animal.

Especially notorious is cod liver oil, which is rich in very highly unsaturated acids. Small daily doses will greatly cut milk production in cows and goats. Four per cent in the diet will kill guinea pigs by producing muscle lesions.

ESSENTIAL FATTY ACIDS

Rats are so limited in their synthesis of linoleic acid that they will not survive if it is excluded from the diet. It is now called essential and its absence leads to (1) scaly skin; (2) marked retardation of growth; (3) kidney lesion and hematuria; and (4) early death. No other plant acid completely replaces linoleic. Linolenic acid will cause renewed growth but does not clear the skin. A similar action is shown by the highly unsaturated acids of cod liver oil. The only known animal acid comparable to linoleic in its effects is arachidonic.

Practical results are now coming from research as the nutritive value of fats. Some eczemas of both infants and adults have responded to doses of oils like linseed, corn and lard, when no other treatment was satisfactory. Also the skin lesion, acro-dynia, attributed to vitamin B₆ deficiency is alleviated by doses of oils or linoleic acid. A high per cent of fat in the diet will prevent beri-beri, and gives the highest muscular efficiency. Milk production in cows declines when the diet contains less than 4 per cent fat.

In view of the above facts it is clear that fat cannot be excluded from the diet and fairly high levels are indicated for optimum living.

Production, Utilization and Significance of Blood Proteins

(Annual Lecture of the Minnesota Pathological Society)

GEORGE H. WHIPPLE

*Professor of Pathology and Dean of the Medical School,
University of Rochester*

Dr. Whipple spoke on the origin and importance of the proteins of the blood, particularly the proteins of the blood plasma. In brief outline the evidence was presented, largely from Dr. Whipple's own experiments, to show that the liver unquestionably plays an important role in the production of the plasma proteins. The evidence for this role in the production of the albumin fraction seems to be unequivocal, and

probably the majority of the globulins of the blood plasma also have their origin in the liver.

The primary method of study used by Dr. Whipple and his associates at the University of Rochester Medical School consists in plasmapheresis experiments on dogs coupled with careful studies of the nitrogen intake and excretion. The dogs are rendered hypoproteinemic by removing relatively large quantities of the blood, separating the cells and serum, and returning the blood corpuscles suspended in saline solution to the blood stream. By this means the animal loses at a single such experiment up to one-sixth of its total plasma proteins. This procedure is repeated as often as is necessary to maintain the plasma protein concentration at any given low level. The animals suffer no injury in such experiments other than the reduction in the plasma proteins and they continue in apparent vigorous health.

Such hypoproteinemic dogs have been studied for years by Dr. Whipple and associates, during which time the rate of regeneration of the plasma proteins could be followed from day to day. It is a striking feature of these studies that they show clearly the great reserve of plasma protein-forming power in the animal, the rate of regeneration being several times as great as that of hemoglobin. However, with many of these animals Whipple and his associates were able to maintain very constant low protein concentrations in the blood plasma. Down to 4 per cent protein concentration there is no apparent effect on the animal whatsoever. At around 3.5 per cent protein concentration in the plasma, there is a tendency to edema which can be demonstrated if the animal is given large quantities of saline, or otherwise treated in a fashion calculated to initiate the onset of edema. At about 3.3 per cent concentration, the animals become definitely edematous.

Studies of the albumin-globulin ratio in these animals showed that apparently globulin is more readily regenerated than albumin, and the A/G ratio in dogs subjected to long continued repeated plasmapheresis is apt to be closer to 1 than to the normal ratio of about 2.

A very important part of the study at the University of Rochester by Whipple and his associates is the careful evaluation of the readiness with which different types of food can supply nitrogen for the regeneration of the plasma proteins. The best food of all for this purpose was blood serum itself, but liver, heart and kidney were also very effective. In these studies a great variety of food stuffs were tested and the amount of organic nitrogen in the food which was used to make new protein in the blood was measured. Plant proteins can also be used to synthesize plasma proteins in the body, by the dog, but in general they are less effective than proteins of animal tissues.

As might be expected, the efficiency with which fed proteins are converted into plasma proteins in the animal body varies with the amounts supplied. If a great excess of protein is fed, the efficiency is low, but when the protein intake is restricted, the efficiency may be as high as 35 per cent with feeding of serum proteins themselves. In other words, 35 per cent of all the nitrogen in the fed serum reappears in the blood plasma as plasma protein. The efficiency of utilization of kidney, liver and heart is from 15 to 24 per cent when these are fed in limited amounts. Other protein foods exhibit efficiencies from 5 per cent to values approaching those for kidney.

After ascertaining the types of food most effective, Whipple and his associates are now studying the utilization of the various pure amino acids in the regeneration of plasma proteins. Marked differences between the amino acids in this respect have already been noted, and more particularly certain combinations seem to be more effective than others. Among the

amino acids which are being studied intensively at this time in this work are alanine, glutamic acid, cystine, and methionine.

This work has re-emphasized the importance of the plasma proteins in the maintenance of a normal fluid balance between the blood and the tissues, and has shown how sharp is the critical point between normality and the edematous state. The nutritional aspects of the work are, however, of greater consequence, particularly as they should provide very much more precise knowledge about the necessary amounts and substances required for the maintenance of nitrogen equilibrium. In the course of the work, there is accumulating a growing body of data which can be viewed as fundamental to our understanding as to the mechanism whereby the plasma proteins are formed in the body.

Investigations Concerning the Problem of Thrombosis

CHARLES H. BEST

Professor of Physiology, University of Toronto

After a brief historical resumé, Dr. Best described the so-called white thrombus which is composed mainly of platelets. In tracing the history of heparin, it was pointed out that the first useful preparation of an anticoagulant from normal tissues was obtained by McLean in Howell's laboratory. Professor Howell pioneered in the field of purification of heparin and in the study of its mode of action. In collaboration with several of his associates, Dr. Best undertook in 1929 to explore further the physiological role of heparin and its clinical application. Purified preparations were obtained and Jorpes showed that the anticoagulant was a sulfuric ester of a carbohydrate. The precise chemical constitution is still uncertain but according to Dr. Best the substance may be considered to be a carbohydrate complex containing probably a uronic acid and glucosamine, the latter partially or totally acetylated with respect to the N-containing group. The hydroxyl groups of the complex are in part or totally esterified with sulfuric acid in such a way that the N:S ratio is 2:5.

The site of formation of heparin in the body is still uncertain but much evidence indicates that the mast cells of Ehrlich found mainly in connective tissue near capillaries and in the walls of the larger blood vessels may be the source.

There is considerable evidence that the incoagulability of the blood in anaphylactic shock is due to the liberation of heparin.

The administration of suitable doses of heparin greatly prolongs the clotting time of blood. Continuous intravenous administration of material diluted in saline provides the best procedure for experimental work. The formation of thrombi on the intimal surface of veins which had been injured by mechanical or chemical means can be completely prevented by adequate administration of purified heparin. The traumatized vein can be made to heal completely without formation of a thrombus. In analyzing this effect a most important result was obtained, namely that heparin prevents the agglutination of platelets either in the blood vessels or in glass cells. This observation gives more than a clue as to the mechanism by which heparin prevents the formation of mural thrombi.

In discussing the clinical applications, attention was called to the importance of having a highly purified non-toxic material. There is little doubt that heparin is a valuable adjuvant in vascular surgery, and it has been used in connection with transfusions as well as in those situations in which it can be employed as a prophylactic against thrombosis and subsequent embolism.

C. SOME ASPECTS OF IMMUNITY AND CHEMOTHERAPY

Presiding: WINFORD P. LARSON

Professor of Bacteriology, University of Minnesota

Recent Chemical Trends in Study of Immunity

MICHAEL HEIDELBERGER

*Associate Professor of Bio-Chemistry
Columbia University*

Dr. Heidelberg traced the history of our knowledge concerning antigens and antibodies as chemical entities. Most antigens are proteins. The researches of Landsteiner showed that the introduction of various chemical groups into the nuclei of proteins caused the appearance of serological specificities differing from those the protein possessed originally. The term "haptens" was introduced to characterize the chemical group so added to proteins which overshadowed the original specificity of the protein and would cause cross reactions between otherwise unrelated proteins. Almost any chemical alteration at any portion of the molecule may produce a rather characteristic change in specificity.

The protein antigens directly involved in infectious diseases are in general not well studied. Certain bacterial toxins, for example that of diphtheria, have been intensively studied. The latter appears to be a protein of 72,000 molecular weight. Certain of its properties have been established but much remains to be done.

In the large group of encapsulated micro-organisms to which the pneumococcus belongs, the most important antigen occurs in the capsular layer. Each serological type of pneumococcus seems to be characterized by a polysaccharide to which the type-specific serological reactions are due.

In connection with the chemical nature of antibodies Dr. Heidelberg stated that it is now generally conceded that antibodies are not merely hypothetical substances of unknown nature associated with globulin but are actually modified serum globulins. These modified globulins (antibody) constitute as much as 50 to 75 per cent of total serum globulin in immune serum.

A theory of Breinl and Haurowitz seems to be substantiated by these findings. According to this theory, an antigen adsorbs at a cell surface (site of antibody production) and impresses upon the new globulin molecule being formed a special configuration which is a mirror image of the antigen molecule. This explains quite satisfactorily the success of later combination, by adsorption, of antigen with specific antibody. Dr. Florence R. Sabin used a colored protein antigen to trace the origin of antibody to the phagocytic cells of liver, spleen, tissues, and lymph nodes, which normally produce serum globulin.

Dr. Heidelberg, in his own work, is striving to establish immune phenomena on a rational, quantitative chemical basis. In an effort to develop microanalytical techniques for analysis of antigen and antibody, he has ingeniously chosen to use a N₂-free antigen, type III pneumococcal polysaccharide. This makes it possible to analyze an antigen antibody precipitate for antibody by direct nitrogen determination, and for antigen by difference. On the basis of a number of assumptions he has devised a theory to explain quantitative relationships between antibody and antigen. In applying this theory to both precipitin and agglutinin reactions, the important observation was made that type specific pneumococcal anticarbohydrate was found to be the same whether measured as agglutinin or as precipitin.

These new methods of analytical control and improved methods of immunization have made available a rabbit antiserum against H. influenzae, Type B, of 5 to 10 times the potency of older immune sera.

Ultracentrifuge studies have revealed a biochemical basis for the superiority of rabbit antipneumococcal serum over serum of such animals as the horse, cow and pig.

The Biology of Animal Virus Diseases

ROBERT G. GREEN

Professor of Bacteriology, University of Minnesota

Dr. Green developed the thesis that by a series of adaptations microbes are gradually transformed to incomplete forms of life which because of their minute size are called viruses. He pointed out that there is no fundamental difference between diseases caused by microbes and those caused by ultra-microbes. The ultra-microbes range in size from structures barely visible under the microscope to disease incitants which are particles about 1/25 that size. The viruses are differentiated from bacteria first by their smaller magnitude and second by their inability to grow on artificial media. This obligatory parasitism is an important aspect of their nature. Dr. Green infers that viruses are related to free living forms from which they have developed by adaptation associated with parasitism. He refers to these processes as a sort of retrograde evolution.

Dr. Green discussed at some length the detailed study of fox encephalitis and canine distemper which he has carried on for a number of years. He pointed out that particular viruses have predilections for certain cells and organs in the body of the host and that the sites of preference depend upon the history of the virus itself. In the spontaneous disease, the site is somewhat different from that produced experimentally by animal passage. Dr. Green concludes that viruses may be definitely modified by the different environments which they find in unrelated species of animals. This power of adaptation is of great importance to the survival of the virus itself but is of equal importance in providing a means whereby an immunity may be established to an altered virus which will protect against the more virulent original form.

Observations upon the Mode of Action of Sulfanilamide and Its Derivatives

PERRIN H. LONG

*Associate Professor of Medicine
Johns Hopkins University*

Dr. Long discussed the mode of action of sulfanilamide and its derivatives. In his introduction he stated, "It has seemed strange to some that although more than six years have elapsed since Foerster first reported upon the clinical use of Prontosil in the treatment of a staphylococcal infection, there is still doubt in the minds of many observers concerning the mode of action of sulfanilamide and its derivatives. However, it is to be remembered, that despite more than twenty-five years of intensive investigation, pertinent facts regarding the action of arspenamine upon the spirochaete are just coming to light, and that knowledge of *how* and by what mechanisms chemotherapeutic agents in general are effective, is very scant. In view of our lack of information on the fundamental processes which are involved when an effective chemical agent injures or kills a susceptible micro-organism, it is scarcely surprising that one cannot explain in definite terms the way in which sulfanilamide and its derivatives behave in the control of infectious diseases."

"In Gerhard Domagk's original report upon the chemotherapeutic effects of Prontosil in experimental hemolytic streptococcal infections in mice, the fact that the drug was effective "*nur im lebenden Organismus*" was stressed, as was also its lack of bacteriostatic or bactericidal effect *in vitro*. This observation has been repeatedly confirmed in respect to Prontosil and its companion azo-dye, Neoprontosil."

Further he said, "In discussing the mode of action of sulfanilamide and sulfapyridine, it should be borne in mind that while their activity appears to be directed solely against the invading micro-organism, the recovery of the infected subject seems to entail two factors—the drug factor and the host factor. That is to say that while the drug can bring the infection under control, it requires the coöperation of the host's defense mechanism to dispose of the infectious agent. This statement is in agreement with the conception of those investigators who have attacked the problem by studying the *in vitro* and *in vivo* effects of these drugs.

"Under the heading of the drug factor comes the activity of these compounds in inhibiting the growth of, or possibly actually killing, susceptible bacteria and their ability to neutralize the harmful effects of the toxic products of certain micro-organisms. The host factor represents the response of the body's defense mechanisms, such as antibody production and mobilization of phagocytic cells to the infection produced by micro-organisms which have been altered as a direct result of the drug factor.

"Quite recently, Shaffer has advanced the hypothesis that sulfanilamide is oxidized in the presence of hydrogen peroxide, plus essential catalysts, to an active compound. This product is so strong an oxidant that it destroys catalase, thereby permitting more hydrogen peroxide to accumulate. As a result, more and more of the oxidation product of sulfanilamide is formed until eventually a concentration is reached which is sufficient to attack all reactive reducing systems of the cell, and bacteriostasis or actual killing of the micro-organisms ensues."

He discussed another chemical hypothesis concerning the mode of action of sulfanilamide proposed by Mellon and his collaborators. "These observers noted that dilute solutions of sulfanilamide which had been irradiated with ultraviolet light, possessed the property of inactivating catalase. It has been long known that if catalase is inactivated in aerobic cultures of pneumococci, peroxide accumulates rapidly and may reach a concentration that is bactericidal for the pneumococcal cells. Hence, it was reasoned that if sulfanilamide was able to inactivate catalase, peroxide would accumulate and this factor might account for the bacteriostatic or bactericidal action of sulfanilamide."

They described the mechanism as follows: "The growing bacterial cell has the power to convert sulfanilamide, presumably through mild oxidation, into a derivative which is a highly active anticatalase. This reaction produces an accumulation of anticatalase in the immediate vicinity of the cell. The streptococcus and pneumococcus, being active producers of hydrogen peroxide, are able to grow only so long as the peroxide concentration can be kept below a critical level by outward diffusion or destruction . . . in the presence of anticatalase, inactivation of catalase takes place in the zone immediately adjacent to the cell with resultant accumulation of hydrogen peroxide to toxic levels."

Dr. Long presented a third theory concerning the mode of action of sulfanilamide which he says is based upon the idea "that the drug acts on bacteria to prevent them from utilizing the substrate or upon the substrate to prevent it being utilized by the bacteria. Levaditi who was one of the first to champion this belief, considered that sulfanilamide was changed to a sulfur-protein complex in the body cells. This compound he called the "active principle X" and he thought that it blocked

"the assimilative potential of the nutritive materials which the body places at the disposal of the metabolism of the (virulent) streptococci."

"Some time later Lockwood independently arrived at a somewhat similar concept of the mode of action of sulfanilamide. His observation, that the addition of small amounts of peptone to human serum cultures definitely decreased the bactericidal, and in some instances, the bacteriostatic effects of the drug upon virulent hemolytic streptococci, led him to suggest 'that sulfanilamide prevents the specialized metabolic activity required of invasive organisms' and 'that this effect may be achieved through prevention of the utilization of the protein substrate by the organisms.' "

He concludes, "It seems quite probable from the evidence now available, that the chemotherapeutic activity of Prontosil and Neoprontosil in streptococcal infections is the result of their break down to sulfanilamide in the tissues of the infected host. Sulfanilamide and sulfapyridine act as bacteriostatic and, under certain conditions, as bactericidal agents against susceptible bacteria. They also seem to have the power of inactivating certain bacterial toxins.

"The mechanism by which these drugs produce bacteriostasis and inactivation of toxins remains unknown despite several attempts to explain it. The importance of the response of the host, to an infection which is treated by chemotherapy, should be recognized if a complete picture of the mode of action of these drugs is to be acquired."

Chemistry in Urinary Antisepsis

HENRY F. HELMHOLZ

Professor of Pediatrics

The Mayo Foundation, University of Minnesota

Dr. Helmholz traced the history of the chemical approach to this problem, beginning in 1878 when the alkalization of the urine was recommended for the treatment of infections with an acid urine and acidification in cases of ammoniacal cystitis. Although acidification is now known to be definitely advantageous, it is doubtful whether acid therapy in the early days brought about the necessary degree of acidification necessary to produce bactericidal effects. Methenamine was first shown to have antiseptic effects in acid urine in 1884. This substance remains unchanged in an alkaline medium but is split into ammonia and formaldehyde in acid. Dr. Helmholz showed some years ago that methenamine in a given concentration was much less effective as a bactericidal agent in urine at a pH of 6.0 than at pH 5.5. There was found to be a definite correlation between the pH and the concentration of methenamine necessary for complete bacteriostasis.

The history of the use of numerous other drugs was described, the majority of which have been discarded in favor of acidification therapy and the sulfonic acid derivatives. The importance of beta-oxybutyric acid grew out of observations that acid urines produced by ketogenic diets were more bactericidal than would be expected from the pH. It was found that the keto acid, itself, possessed bactericidal properties which were in proportion to the amount of the free acid. It was a great advance when Rosenheim suggested the use of mandelic acid in place of the butyric since the latter is very much more difficult of administration than the former.

The most recent chapter in urinary antisepsis is that involving sulfanilamide and its relatives. This chemotherapeutic agent is valuable because its action is not dependent upon an acid urine and can be used when there is severe impairment of kid-

ney function. It is however effective with a limited number of types of organisms. There is still no single universally useful urinary antiseptic and Dr. Helmholtz pointed out that many new sulfonic acid compounds should be tested for their bac-

tericidal effect on bacteria found in urinary infections. In concluding he said, "Our greatest problem today lies in the treatment of the patient having damaged kidneys and in those with an alkaline urine produced by bacteria splitting urea."

D. SOME APPROACHES TO THE NERVOUS CONTROL OF THE ORGANISM

Presiding: ANDREW T. RASMUSSEN

Professor of Neuro-Anatomy, University of Minnesota

The Physiochemical Approach to the Problem of Convulsive Mechanisms

IRVINE MCQUARRIE

Professor of Pediatrics, University of Minnesota

The purpose of this paper was to review certain experimental data obtained from investigations on the mechanism of generalized convulsions. It was pointed out that further progress toward a solution of the enigma of epilepsy appears at the present time to depend upon an elucidation of the convulsive mechanism *per se* because all efforts to discover an organic or metabolic basis for this disorder have failed.

On the tentative assumption that the central physiochemical events of a generalized convulsion, like the outward neuromuscular manifestations, are similar, no matter what the inciting cause, studies relating to the convulsive mechanisms were made in the better understood convulsive disorders, hypoparathyroidism and hyperinsulinism, as well as in epilepsy itself. The grand mal seizure of genuine epilepsy and generalized convulsions induced experimentally or occurring in other disorders have recently been shown by Berger, Gibbs and Lennox, and others to be the outward manifestations of increased electrical activity in the cerebral cortex as indicated by electroencephalographic "brain wave" tracings. What remains to be determined in the case of epilepsy is: (1) the nature of the chemical and physical reactions giving rise to such abnormal electrical potentials and (2) the character of the innate or constitutional defect in the brain cells of the epileptic which is responsible for the peculiar periodic breakdown in the physiological mechanism governing the normal rhythm of electrical potentials.

It has been recognized for some time that a heterogenous series of factors, such as alkalosis, excessive cerebral excitation of various types, cortical injury and "superhydration" of brain tissue (under certain conditions) tend to provoke typical seizures in epilepsy; while other body states, such as sedation, narcosis, acidosis and "dehydration", tend to prevent their occurrence. The facts, (1) that the latter functional states happen to be those associated with a decrease in cell membrane permeability to certain ions and (2) that the former happen to be those having an opposite effect, have suggested that the characteristic convulsive tendency in epilepsy may be related to a disturbance in this basic function of the brain cells. More direct evidence for this tentative interpretation has recently been obtained by Spiegel, who determined the permeability of brain tissue *in vivo* under a wide variety of experimental conditions by means of the electrical conductivity method.

Experiments on epileptic patients have shown that convulsions can be induced in these subjects practically at will by sustained postpituitary (pitressin) antidiuresis when they are maintained on a low-mineral, high-water intake. The dilution

of the extracellular body fluids thus produced is apparently responsible for the convulsion as indicated by the fact that convulsions do not occur if sufficient sodium chloride to prevent such dilution is given during the test. The fact, that normal persons do not have convulsions when a similar degree of dilution of their body fluids is produced, suggests that the protective barrier (brain cell membranes?) against the harmful effects of this change in osmotic pressure is inherently defective.

Experiments on a 15 year old boy suffering from parathyroid tetany showed that generalized convulsions could be induced by such procedures as the above described water-retention test, intravenous administration of fibrile doses of killed typhoid vaccine and voluntary hyperventilation of the lungs after he had been maintained for several weeks on a low mineral diet but not after a diet high in minerals had been used for a similar period. Values for the serum calcium, inorganic phosphorus and proteins were not significantly different for the two periods. During the period of low-mineral intake, prevention of dilution of the extracellular fluids by administration of sodium chloride during the pitressin test greatly lessened the convulsive reaction. Artificially induced fever (diathermy) failed to induce convulsions even during the low-mineral period, presumably because of an excessive water loss in the sweat. Parathyroid extract, caused a rise in the serum calcium and a fall in the phosphorus and prevented the induction of convulsions, in spite of the artificially imposed dilution of body fluids, even during the low-mineral dietary period. The impression obtained from these experiments was that the primary disturbance in calcium and phosphorus metabolism in parathyroid tetany produces a temporary, reversible change in the brain cells which makes them respond to certain changes in body state in a manner resembling that characterizing the epileptic subject.

Extensive studies on insulin convulsions in animals with a view to determining the relative significance of changes in the levels of serum potassium and inorganic phosphorus as well as blood sugar in relationship to the occurrence of convulsions, indicated that hypoglycemia alone shows a constant relationship to the convulsive reactivity. It was likewise shown for both normal and adrenalectomized dogs that breathing atmospheres extremely low in oxygen (5 per cent to 12 per cent) or high in carbon dioxide (15 per cent) either prevents insulin convulsions entirely or greatly delays their onset, even when the degree of hypoglycemia reached is much greater than that required for induction of a convulsion in room air.

These results were interpreted as indicating that anoxia is not the cause of insulin convulsions, as recently claimed by several workers. They further suggest that the role of hypoglycemia may be merely that of effecting a specific change in the brain tissue which permits a certain orientation of ions on cell surfaces with the resulting development of abnormal electrical potentials.

Methods of Analysis of Nervous Action

HERBERT S. GASSER

Director, Rockefeller Institute for Medical Research

Dr. Gasser commented on the historical background of research in the field of neurophysiology.

"The history of neurophysiology is characterized by much astute reasoning, stimulated by the obscurity with which the nature of the nerve impulse has been surrounded and prompted by the desire to penetrate through the obscurity to something intellectually tangible. Illuminating ideas have appeared far in advance of the time at which they could be proved or disproved. Many of these ideas have been embodied in the form of models. For these models physiologists are often criticized—justly and unjustly. Justly, because models can belie their proper function as tools in empirical research and defeat the methods of science by becoming vehicles for the projection of a creation of the observer's mind upon reality. Unjustly, because models in their place are valuable. When a biological phenomenon can be imitated in a physical or chemical system, our faith is strengthened that a physicochemical interpretation of the phenomenon can be found. Observations are made and fragments of information are gained. Integrated into the model, these fragments acquire a wider meaning and the model, enriched, acquires a greater usefulness."

"Nerve models have now been developed to a degree of complexity which prevents their construction outside of the imagination. It is necessary to combine the core conductor principle of Hermann with a concentration cell of Nernst, or a sieve membrane of Ostwald, and then in some way to assimilate the combination with the iron-wire model of Lillie, in order to arrive at even a skeleton representation of the membrane hypothesis. The modern era of nerve physiology started with the membrane hypothesis. And so well has the hypothesis served that at no time during its history has it found a competitor. Today it stands more firmly entrenched than ever before.

"As you know, according to the tenets of the hypothesis, a nerve fiber is considered to be a fluid conductor, surrounded by a labile surface film maintained in a steady state through the expenditure of energy derived from oxidation in the fiber. Across the film a potential gradient is maintained by an ionic concentration difference at its borders, and possibly by other factors. During activity a molecular change is supposed to occur in the surface, with a resultant fall of the potential gradient, a flow of current from the adjacent segments and excitation of these segments by the current,—the whole process being repeated throughout the length of the fiber and constituting the nerve impulse. Such in brief is the theoretical background for the physical and chemical measurements that make up the analysis proper."

Dr. Gasser pointed out that nervous action can be studied by observing the effect of the nerve on the organ that it innervates or by studying the changes that occur in the nerve itself when it is active. These changes, while they are probably fundamentally chemical, have physical concomitants which are easier to observe. One can measure the heat production associated with the passage of a nerve impulse, but the most useful sign of activity in a nerve is the electrical potential change. This change takes place with great speed and by the use of accurate electrical recording instruments, time factors as well as intensity factors can be studied.

In discussing the form of the action potential, Dr. Gasser said, "A word of explanation must be introduced at this point in order to make clear why the form of the action potential is of interest. The details of the form are known through the parts of the nervous system that are readily accessible to observation—the nerve fibers. Three kinds of nerve fibers exist,

which differ somewhat in their properties; but in all three the configuration of the action potential is in accord with a basic pattern. The action starts out with a large, short negative deviation, known as the spike, and is continued with a relatively prolonged set of changes of low voltage known as the after-potentials. In their simplest form the after-potentials start out with a negative component (in one fiber class this component is vestigial) and are continued by a longer positive component. During the period of the negative component the fibers are more excitable than when they are at rest, and during the period of the positive component they are less excitable.

"Numerous bits of evidence support the view that in the central nervous system the action potential of the neurons follows the basic pattern to the extent at least of being made up of a spike followed by a positive after-potential. As a corollary to this view it would follow that during the period of the positive after-potential in a postganglionic fiber it would be more difficult for impulses to pass the synapse. In favored positions, where the relationship can be tested, this correlation has been found to hold."

In conclusion Dr. Gasser remarked, "It is scarcely any longer prophetic to look forward to a biology in molecular dimensions, for there is no small amount of contemporary interest in intramolecular and intermolecular patterns,—witness the recent history of the myosin fibril. And there is a growing body of knowledge relating to the subject, based upon direct and indirect information derived from physical and chemical methods.

"In nerve physiology the goal toward which we are turned is a complete understanding of nerve mechanics. It is not too soon to demand knowledge of the position of the molecules in the fibers; nor is it too audacious to inquire into how molecules move during activity. Of all the highly differentiated and highly active structures of the body, a nerve fiber is one of the simplest. Hence, if any biological structure is to be proven not too complex as a physical system to be subjected to successful analysis, it should be this one. At any rate, until answers have been obtained to the questions that have been posed, full meaning content cannot be put into the term 'irritability.'"

The Nervous System in the Regulation of Visceral Processes

DETLEV W. BRONK

*Professor and Director, Institute of Neurology
University of Pennsylvania*

Dr. Bronk described the general attack on the fundamental processes of nervous conduction which is being carried on by means of the ultra-modern physical tools developed by Gasser and Erlanger at St. Louis, Adrian and Matthews at Cambridge University, and at Dr. Bronk's own laboratory in Philadelphia. The recording of the form, voltage, and frequency of the impulses in nerve fibers has now reached almost incredible degrees of delicacy. Much of this work involves the accurate registration of the nerve impulses passing along single nerve fibers—in many cases at rates exceeding 30 impulses per second.

Nerve trunks are cut until only a very few, or perhaps only a single nerve fiber, remain to carry the messages between the periphery and the center. When electrodes are placed on such nerve fibers, there appears a regular succession of discrete impulses instead of the confused surge of electric potentials which is obtained from the ordinary "nerve" which contains many individual fibers. If only a single fiber remains intact, the impulses, from a quiet end organ maintained under constant conditions, come over the attached nerve fiber with great regularity. Each potential wave has the same voltage and these waves appear at absolutely regular intervals unless the end organ stimulus is altered. When such alteration occurs, if there is an increase in the stimulus to the end organ, the nerve messages

are no greater in voltage, but the frequency of the potential waves along the nerve becomes greater. Frequently it may happen that a preparation is made containing two nerve fibers having different thresholds or connected to end organs of different thresholds. It may be that in the resting state impulses of only a single nerve fiber are visible in the oscillographic record. If the stimulus is increased, the impulses along this first nerve fiber do not increase in voltage, but they increase in frequency and finally the second nerve fiber comes into play, sending its own independent messages along at regular intervals so that these may also be recognized in the same oscillographic record.

By such studies with the oscillograph and electrodes placed on partially severed nerves, Bronk and his associates have intensively studied the activities of the carotid sinus. It was already known that the carotid sinus responds to increased arterial pressure by sending impulses which slow the heart and also that the carotid sinus is sensitive to carbon dioxide, so that an increased amount of carbon dioxide in the blood produces increased circulation and respiration by way of stimuli from the carotid nerves to the heart and respiratory centers.

Bronk's work showed clearly that there are at least two kinds of nerve endings in the carotid sinus, and that these act quite independently of each other. The nerve endings in the wall of the sinus are pressure sensitive and play an important role in the regulation of the blood pressure of the body as a whole. The nerve endings in the carotid body are specifically chemically sensitive and their response to alterations in the oxygen and carbon dioxide in the blood is important in maintaining an adequate and proper amount of respiration.

Such studies as those on the carotid sinus are being applied to other parts of the body, in particular it is being attempted to make studies of the pathways within the spinal cord and the gray matter of the brain. The development of these methods provides powerful tools for the attack and the importance of some of the results, such as those on the carotid sinus, has already become apparent.

The Argument for Chemical Mediation of Nerve Impulses

(The Annual Alpha Omega Alpha Lecture)

WALTER B. CANNON

Professor of Physiology, Harvard University

Dr. Cannon pointed out that at the present time there is a heated argument between two schools of thought among neuro-physiologists concerning the mechanism of transmission of excitation across synapses and at nerve end plates. There appears to be a protoplasmic discontinuity in these situations. One

school favors the view that the action current itself stimulates across the interruption; the other holds that the transmission is mediated by a chemical substance set free at a nerve ending. This substance is thought to be adrenalin at sympathetic synapses and acetylcholine at parasympathetic synapses, at synapses in motor end plates and in sympathetic ganglia. Dr. Cannon limited his discussion to synapses in which there is evidence that acetylcholine is liberated. Dr. Cannon pointed out that drugs which block the effect of nerve stimulation do not prevent the liberation of acetylcholine. Therefore he concluded that the nerve impulses are delivered to the tips of the active nerve fibers and finds it difficult to understand why the action current could not stimulate across the synapse. The fact that these same drugs prevent the action of acetylcholine on the end organ when that substance is introduced into the circulation leads him to conclude that it is much more likely that the normal transmission across synapses is of a chemical nature than a physical one.

Dr. Cannon next pointed out that the argument concerning the short delay at synapses can be turned against the electrical theory. This delay is at least five times as long as that required for the quickest cells to respond to electrical currents. Dr. Cannon then brought experiments with the use of curare into his argument. He pointed out that stimulating the motor nerve to a curarized muscle at the rate of 60 shocks a second greatly prolonged the period of paralysis as compared with the symmetrical control muscle tested periodically for recovery from curare. This effect could not be due to fatigue in the muscle for the muscle was not contracting. Likewise it could not be fatigue in the nerve because records of their action potentials showed that the nerve impulses might be full sized when they were having no effect. These phenomena are difficult to explain on an electrical theory of transmission but have ready interpretation on the chemical one.

So with several other experimental phenomena the chemical theory of transmission accounts readily for phenomena which appear now to be unintelligible in terms of the electrical excitation hypothesis. As a final argument Dr. Cannon recalled the experiments of Rosenbluth and Luco who recorded the action potentials of the tongue muscles which had been deprived of motor nerves for about a week. Stimulation of the lingual nerve which supplies the blood vessel to the tongue induced the appearance of typical action currents in the completely denervated muscle fibers. Here, according to Dr. Cannon, is a stimulation of motor units clearly not due to electrical transmission, for the nerve stimulated was not distributed to the muscle which responded and furthermore the latent period was too long for that occurrence. In this instance it appeared that acetylcholine liberated at parasympathetic endings in the blood vessels stimulated the muscles which the blood vessels supply.

III. The Medical School of the University of Minnesota and the Community

In connection with the semi-centennial celebration, two meetings were especially planned for the general public and one evening session was arranged with the interest of the alumni of the medical school and its particular friends in mind. The first of the public meetings was a general University convocation addressed by Dr. Thomas Parran, Surgeon-General of the United States Public Health Service on the subject, "Medical Education, Research and the Public Health." This meeting was attended by more than 4000 persons and

broadcast over the facilities of WLB, the University radio station. Dr. Parran paid tribute to the realism and vision of the physicians in this community who foresaw what a single great tax-supported school could do to serve this state. He devoted the main body of his address to a consideration of the importance of scientific research in medicine to improvement in the health of our people generally. He called attention to the fact that in these unhappy times, which have fallen upon the world at large, the burden imposed on us who have the good fortune to live in the one island of peaceful democracy has become greater. According to Dr. Parran, it should

be obvious that our support of research should be more generous. Never before have added investments in research been so urgently needed. If the wellsprings of private philanthropy cannot meet the needs, there must be increasingly greater use of public funds for this most important object. He said, "Wisely used, it will contribute more to the national defense and prosperity than the biggest of the battleships."

Dr. Parran stressed the importance of a clearer perspective between research and the practice of medicine. He said, "Doctors of Medicine lean upon the laboratory sciences as the stones of the arch upon the keystone." He forcefully emphasized the interdependence of sound medical practice and social conditions. He pointed out the importance of economic status to the occurrence of a considerable number of diseases and insisted that it is becoming more and more necessary for the physician to have a broad background in history, sociology and economics in order that he may view the contribution of his profession, and in particular his own contribution, in a more intelligent way. Dr. Parran spoke at some length concerning the rapidity of the changes in the technical aspects of medicine. He said, "When we rode in stage coaches, no new models were needed until the old vehicles wore out. When mechanical progress began, technological obsolescence set in." It is obvious, according to Dr. Parran, that although there has been much improvement in medical education and much progress in medicine, we still have a long way to go in applying what we already know and in solving the fundamentals of such pressing problems as cancer, poliomyelitis and the degenerative diseases of advancing years.

He said in closing, "It is not by accident that dictatorships arise out of chaos, and chaos from neglect of human misery. If we have the realism to face this fact, we can have the vision to save ourselves the aftermath. Research, medical education and the public health . . . it never mattered so much as now that they should be well and truly done."

At the second public meeting, Governor Harold E. Stassen addressed a large meeting in Northrup Auditorium on "Medicine and the Commonwealth." Governor Stassen referred to the direct interest of the community in the quality of the medical profession that serves it. He spoke of the intimate dependence of the quality of medical practice upon the standards of medical education. He stressed the importance of maintaining the element of individual personal initiative in the medical profession which he said must be maintained in any system for providing adequate medical care for the lower income groups. Governor Stassen emphasized again the importance of training physicians who will be leaders in their communities in order that their social vision and background of culture may play a more important role in the enlightened political life of the community.

Speaking on "The Place of Medicine in a University," President Guy Stanton Ford stressed the advantages which are to be gained mutually by the physical proximity of schools of medicine and other colleges in

a university. He said it is not the difficulties of administration which make close physical contact desirable rather it is the opportunity for day-to-day contact between workers in the various fields which engender sympathetic understanding, and which allow opportunity for suggestion and the sharing of ideas. President Ford said, "Science and research, teaching at all levels and especially in college and professional training, are a seamless web whose pattern determines a nation's welfare and its civilization."

In closing, President Ford paid tribute to the work of the late Dean Elias P. Lyon to whom, he said, more than to any other one man, the University of Minnesota Medical School of today is indebted. In speaking of Dean Lyon's contribution to the building of the medical school, he said, "It was the outcome and is the enduring memorial of the patient, modest and selfless, utterly honest and far-seeing man who came to the deanship of the medical school in the mid-year of the half-century we commemorate."

Professor Anton J. Carlson, from the department of physiology at the University of Chicago, delivered the concluding address of the public meeting on October 12, 1939. In so doing he delivered the first Elias Potter Lyon Lecture entitled, "The Role of the Fundamental Sciences in Medical Progress." He portrayed the inevitable dependence of progress in the applied clinical fields upon progress in all of the more basic natural sciences. He referred to the contributions of physicists in the development of the X-ray and referred to the fact that Professor W. B. Cannon, who took part in the scientific program of this celebration, had been the first to apply the X-ray to a study of physiology and ultimately medicine. He pointed to the discovery of radium, the development of sensitive galvanometers and numerous other physical advances in relation to their importance to clinical medicine. He referred to the contributions of organic chemistry in the fields of nutrition and endocrinology, to the contributions of comparative zoology to our understanding of numerous diseases. In a word, he characterized science as one interdependent whole in which the applied sciences such as medicine derive their vitality from progress in fields which may seem to be far removed but which are in reality their immediate foundation stones. Dr. Carlson took occasion to refer to the vital importance of maintaining unhampered, opportunities for investigations on lower animals. He alluded to the ever present danger of the influence of the so-called anti-vivisectionists, who for false sentimental reasons would have all experimentation on animals abolished. He said that it behooved every member of the medical profession and every intelligent layman who valued the contribution of medical science to human welfare to be forever on the alert against the encroachments of this misguided anti-scientific group which one finds in variable number in every community.

The final evening meeting was a banquet of alumni and interested friends of the medical school held in the ballroom of the Minnesota Union. A sizeable proportion of the alumni of the Medical School of the University of Minnesota gathered to celebrate the achieve-

ments of the first half century and in particular to lay plans for the future. Dr. Harold S. Diehl, dean of the medical sciences, spoke briefly on "The Medical School of the University of Minnesota in Retrospect and Prospect." Although he enumerated the accomplishments of the past, he emphasized particularly the needs for the present and the future. He said that although it was the obvious responsibility of the state to provide the basic essentials for sound medical education, there was a rare opportunity for private funds to convert what might otherwise be just a good medical school into a great one.

The Herman M. Johnson Lecture of the Minnesota State Medical Association was delivered by one of the most distinguished alumni of the University of Minnesota Medical School, Dr. O. J. Hagen, from Moorhead, who was graduated in 1906. Dr. Hagen spoke on the subject, "The Medical School from the Point of View of the Alumni." He paid fitting tribute to the pioneers whose work has left its mark on the medical school and the profession of the state of Minnesota. He expressed the gratification of the alumni over the development of a productive center of medical investigation and teaching in this university and pledged the continuing support of the great body of its graduates.

An address on graduate medical education to have been delivered by Dr. Donald C. Balfour, director of the Mayo Foundation of the University of Minnesota, was read in his unavoidable absence by Dr. Louis B. Wilson, who gave distinguished service for so many years in the same post. Dr. Balfour stressed the growing importance of intensive graduate education in the various branches of medicine. He referred to the requirements of the various specialty boards as evidence that the University of Minnesota, in its Minneapolis and Rochester branches, had begun to render the type of service whose importance is even now impossible to evaluate completely. Dr. Wilson contributed interesting reminiscences of research and teaching in the earlier years of the history of this medical school.

Dr. George Earl, president of the Minnesota State Medical Association, presented the distinguished service award of the association, posthumously, to Dr. William J. Mayo, Dr. Charles H. Mayo and Dr. Herman M. Johnson.

Professor Richard E. Scammon discussed in a very scholarly way, "Progress in Medical Education on the American Scene," with his characteristic vivid and astute analysis. Dr. Scammon traced the growth of the movement toward independence in educational and scientific matters on the American continent. He referred to the important contributions of the American colonials and the birth in the early years of the nineteenth century of a vigorous American school. He referred to the ever increasing relative importance of American medicine to world progress.

The highlight of this alumni gathering was the announcement by Dr. J. C. Litzenberg, as the representative of a committee of the Medical Alumni Association of the University of Minnesota, of the establishment of the Minnesota Medical Foundation. Dr. Litzenberg

characterized the setting up of this foundation as the greatest single contribution ever made to the medical school of the university. He referred not to its economic value, now or even eventually, but to the influence which the alumni of that medical school would be able to exert upon it and in its behalf through the years to come through the agency of that foundation. Dr. Litzenberg reported that some months ago, the officers of the University of Minnesota Medical Alumni Association had appointed a committee of seven members to consider and report plans for integrating the interests and activities of the alumni and the medical school from which they were graduated. After much labor, this committee recommended and was authorized to proceed with the formation of what they decided to call the Minnesota Medical Foundation, in whose articles of incorporation appears the following statement of purpose, "The object and purpose of this corporation is and shall be: to promote the welfare of the community by the coöperation of alumni and friends of the Medical School of the University of Minnesota in improving the undergraduate, graduate and research functions of that Institution; to establish scholarships, lectureships, professorships, research and student loan funds in that institution; to publish and promote the publication of a representative medical Bulletin; and in general, by all legitimate and usual means, to advance the interests of the University of Minnesota Medical School and its alumni, without consideration for benefits bestowed."

The committee which has been responsible for the organization of this Foundation has believed that the alumni and friends of the Medical School of the University of Minnesota could implement their interest in that institution by providing a corporation independent of the State University, itself, but with the function, as outlined in the quotation above. Over the course of time there can be little doubt that this Foundation can exert a very healthy influence in the support of those projects which, as Dean Diehl pointed out earlier in the evening, make the difference between a good and a great institution. Dr. Litzenberg reported that without solicitation, this Foundation had already received a number of substantial gifts. Dr. Litzenberg announced that there would be three classes of voting membership in the corporation and that each member would have equal representation. These classes are (1) Foundation Associates, who shall be persons contributing \$1000 or more to the Foundation; (2) Life Members, who shall be persons contributing \$100 or more to this Foundation; and (3) Annual Members who shall be persons contributing annual dues in an amount to be fixed in the by-laws.

In presenting this Foundation of alumni and friends of the medical school, Dr. Litzenberg expressed the belief that there was a very large number of persons in the community who would welcome the opportunity if it were presented to them of investing funds, small or large, in the greatest endowment which the human race knows, that store of knowledge which can be used to spare mankind from the pain of unnecessary disease, in fact the only store which neither wars nor revolutions can destroy.

The Genesis of Appendicitis in the Light of the Functional Behavior of the Vermiform Appendix*

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OUTLINE

- I. The problem of the vermiform appendix.
- II. Theories of origin of appendicitis.
- III. Our investigations.
 - A. The anatomy of the appendix.
 1. Gerlach's valve.
 2. The musculature of the appendico-cecal junction.
 3. Type of appendico-cecal union.
 4. The lymphoid tissue and glands of the mucosa.
 5. The luminal capacity of the appendix.
 - B. The physiological behavior of the appendix.
 1. Resistance to luminal outflow.
 2. Appendicostomy studies.
 - a) Resistance to luminal outflow and suggestion of fluid secretion.
 - b) Injection of bacteria.
 - c) Retention of foreign bodies.
 - d) Spectrographic evidence of barium retention.
 - C. Proof of the secretory activity of the vermiform appendix.
 1. Method.
 2. The secretory behavior of the cecal appendage in animals.
 - a) Obstruction of the cecal appendage in various animals.
 - b) Obstruction of the vermiform cecal appendage of the rabbit.
 - c) The secretory capacity of the vermiform appendix in anthropoid apes.
 - d) Obstructed appendicostomies in man.
 - D. The nature of the fluid secreted.
 - E. Observed histologic reactions in obstructed appendixes which secrete fluid.
- IV. Revision of pathologists' concept of appendicitis necessary.
- V. The origin of appendical obstructions.
 - A. Nature of fecaliths.
 - B. Filling and emptying of the appendix.
- VI. The myth of appendicitis and diet.
- VII. Appendicitis—a problem of the public health.
- VIII. The frequency of appendicitis.
- IX. Necessity for revision of the clinician's concept of appendicitis.
- X. Need of revision of indications for excision of the vermiform appendix.
- XI. Summary.
- XII. Conclusions.

IT is indeed a high honor to be invited to deliver a Lewis Linn McArthur Lecture under the Frank Billings Foundation—a privilege of which I am deeply conscious and appreciative. Doctor McArthur's great interest in and contributions to the appendicitis problem suggested the subject of this lecture as a suitable one for discussion this evening.

That an important problem demanding solution exists with reference to the vermiform appendix is apparent in the persistently high mortality of diseases of the appendix. In the United States alone 16,000 to 18,000 persons have died each year of appendicitis. The average mortality during the last five year period has been 17,114 deaths per year. As a matter of fact one of the highest reported mortalities of the disease in the world is reported for the United States (table 1). This is the more to be lamented in that it was the observation of an American, the brilliant Reginald Fitz¹ of Boston, which established definitely a causative relationship between affections of the vermiform appendix and suppurations in the right lower quadrant of the abdomen, theretofore commonly called perityphlitis. Furthermore, it was Charles McBurney² of New York who was the first to advocate excision of the appendix early in the acute attack, which practice John B. Murphy³ of Chicago endorsed independently soon thereafter. In England we find the late Sir Frederick Treves⁴ as late as 1902 (as a matter of fact, in the very week in which he operated upon King Edward VII who was awaiting coronation) insisting there was no disease in the appendix until the peritoneum was involved and that five days should elapse following the onset of the attack before the surgeon intervened. Despite the somewhat dilatory acceptance of early operative intervention for acute appendicitis in England, their achievement with the problem of appendicitis is far better than our own.

Leonardo da Vinci said that the supreme misfortune which can befall a man is when theory outstrips performance. This ill fortune appears to have overtaken the American surgeon in dealing with appendicitis, for whereas the technic of removal of the appendix in experienced hands has attained a standard of completion difficult to improve upon, yet an unwarranted and unaccountably large mortality still continues. The same problem, though in somewhat lesser degree, confronts surgeons everywhere. How can the dismal showing of table 1 be improved upon?

THEORIES OF ORIGIN OF APPENDICITIS

The observations of Volz,⁵ Matterstock,⁶ and Fitz¹ in the nineteenth century stressed mechanical causes as the principal etiologic agents of appendicitis. In the

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TABLE 1

Deaths from Appendicitis per 10,000 of Population from Various Countries of the World

(Taken from Statistisches Jahrbuch für das Deutsche Reich 1937, p. 30, under section of internationale übersichten)

Year	Country	Deaths per 10,000 Population	Year	Country	Deaths per 10,000 Population	Year	Country	Deaths per 10,000 Population
1934	Canada	1.5	1935	Belgium	.8	1933	France	.4
1934	United States	1.4*	1934	Germany	.8	1935	Hungary	.4
1935	Switzerland	1.3	1935	Great Britain	.8	1934	Japan	.4
1933	Sweden	1.0	1935	Italy	.7	1934	Greece	.3
1934	Union South Africa (Whites only)	1.0	1935	New Zealand	.7	1933	Spain	.3
1935	Australia	.9	1934	Norway	.7	1934	Portugal	.2
1935	Denmark	.9	1935	Netherlands	.5	1934	Uruguay	.2

*Mortality for United States in 1935 is 12.6 per 100,000 population (Mortality Statistics 1935 United States Census 16,142 deaths from appendicitis—estimated population July 1, 1935, 127,521,000).

TABLE 2

Mucosal Folds About the Appendical Orifice*

Folds Present on Superior and Inferior Cecal Wall	Number of Specimens	Per Cent
Gerlach's mucosal fold	183	34.8
Gerlach's and one semilunar mucosal fold	147	27.9
Gerlach's and two semilunar mucosal folds	82	15.6
Gerlach's and three semilunar mucosal folds	1	.2
Gerlach's and Nanninga's mucosal fold	16	3.0
Total with Gerlach's mucosal folds	429	81.5
No folds about the orifice	89	16.9
No Gerlach's fold; one secondary mucosal fold	1	.2
Longitudinal mucosal folds	5	1.0
Complete ring	2	.4
Total without Gerlach's folds	97	18.5
Total orifices	526	100.0

*Mucosal folds about the appendical orifice of 526 adult and fetal cases, or 77.92 per cent of the total series of 675 specimens.

meanwhile a host of other suggestions have been made concerning the origins of appendicitis, and new factors of latitude, longitude, diet, and habits of life have come to be considered as important items in the genesis of the disease. There are those who insist that appendicitis is solely a question of geography, diet, and culture. On the other hand an even larger group, counting amongst its number men accorded first rank among medical investigators, affirms that appendicitis is entirely infectious in nature. Of the group who contend that appendicitis is exclusively of bacterial origin, those who held to its hematogenous origin have been succeeded in turn by those who contended that swallowed organisms from the nasopharynx lodged in the appendix and gave rise to inflammation. Aschoff, whose opinions and expressions command attention always, has gone so far as to assert that appendicitis is a specific bacterial disease (not unlike gonorrhoea in its specificity) due to the enterococcus type B of Gundel. This organism Aschoff⁷ finds as a usual inhabitant of the distal third of the normal appendix. The proximal two-thirds of the appendix he finds has a mixed bacterial flora not unlike that of the cecum. What the provocation is which causes these organisms lurking in the terminal recess of the appendix to become invasive, Aschoff fails to describe.

This dilemma over what the nature of appendicitis may be is of more than academic interest. The confused state of medical opinion with reference to the origin of appendicitis contributes unquestionably in no small measure to the mortality of the disease. Whereas a disease

may be treated in an empirical fashion fairly successfully, an adequate appraisal of its nature lends invariably in the better understanding a tremendous impetus to the correction of defects in management. If the cause or causes of appendicitis were known, a more ready general acceptance by both medical profession and public would be found for advised therapeutic procedures. We can not confront the public with an intelligent program directed at solution of the appendicitis problem and gain its confidence while our ideas of the origin of the disease are in so chaotic a state.

OUR INVESTIGATIONS

Mindful of the paucity of specific infections in the intestinal canal and the bad relationship structurally of this narrow diverticulum to the remainder of the intestinal canal, the writer set out five years ago to re-investigate the obstructive causes which had been emphasized by Fitz and accepted by van Zwalenburg⁸ and Wilkie⁹ but which had become set aside virtually by the cogent declarations of Aschoff. In these investigations I have had the helpful assistance of many willing associates. It is a pleasure to acknowledge here the impetus which this project has had from W. F. Bowers, R. E. Buirge, C. Dennis, W. P. Ritchie, B. A. Smith, Jr., and R. L. Varco. This lecture is in effect a brief summary of those joint labors,^{10,11,12} some of which observations have been described already while others are in process of being published.

TABLE 3

Incidence of Obscuration of Appendical Orifices by Mucosal Folds				
	Hidden	Partially Hidden	Not Hidden	Total
Fetal	0	0	57 (100.0%)	57
Others	57 (12.3%)	77 (16.5%)	331 (71.2%)	465
Total	57 (10.9%)	77 (14.8%)	388 (74.3%)	522

TABLE 4

Classification of Cecums					
	Number	Treves' Type I	Treves' Type II	Treves' Type III	Treves' Type IV
Fetal	63	63			
Term — 1 year	25	20		5	
1 — 10 years	12	5		6	1
11 — 20 years	7	1		5	1
21 — 30 years	9	1		8	
31 — 40 years	16	1	1	13	1
41 — 50 years	33	3	1	26	3
51 — 60 years	37	7	1	27	2
61 — 70 years	33	2	2	25	4
71 — 80 years	23	2		18	3
81 — 84 years	4			4	
Total	262	105 (40.1)	5 (1.0)	137 (52.3)	15 (5.7)
Fetal	63	63 (100.0)			
Term — 84 years	199	42 (21.1)	5 (2.5)	137 (68.9)	15 (7.5)
Term — 10 years	37	25 (67.6)		11 (29.7)	1 (2.7)
11 — 84 years	162	17 (10.5)	5 (3.1)	126 (77.8)	14 (8.6)
Treves	100	(2.0)	(3.0)	(90.0)	(5.0)
Berry	100	(10.0)	(6.0)	(80.0)	(4.0)

1. ANATOMY OF APPENDICITIS

Gerlach's valve.—In 1847 Gerlach¹³ related the instance of a boy of 15 with abdominal pain to whom he administered castor oil in repeated doses and later enemas. At necropsy, perforation of the vermiform appendix at its base was found. There was a fecal concretion in the lumen of the appendix beyond the site of perforation. On opening the cecum the author found a mucosal fold overlying the appendical orifice. In 9 necropsies such a mucosal fold was observed 4 times; it was absent in 5. Much debate has hedged about the significance of the observations of this fold. The painstaking German anatomist Toldt¹⁴ recognized this mucosal fold and it has come to be known as Gerlach's valve. In the main, both anatomists and clinicians, however, have discredited it largely as having any importance. Lafforgue¹⁵ examined 200 cadavers and found a fold much as described by Gerlach two times. In 27 fetuses it was not observed. Colley¹⁶ failed to find Gerlach's fold overlying the appendical orifice in 152 necropsies and referred to its presence as a myth. Oberndorfer¹⁷ denies it any significance, but Hansemann¹⁸ believes it plays some role in the genesis of appendicitis.

Our own observations (Buirge and Wangenstein¹¹) are summarized in table 2. It is to be noted that one or more mucosal folds overlay the appendical orifice in 81.5 per cent of cases. These folds are observed usually in the superior cecal wall. The primary fold overlying the appendical orifice is referred to in table 2 as Gerlach's fold.

The extent to which obscuration of the appendical orifice occurred through the agency of mucosal folds is

indicated in table 3. It is to be noted that in all fetal specimens there was direct continuity between appendical lumen and cecal cavity. The majority of appendical orifices (80 per cent) are less than 6 mm. in diameter. A large number of specimens in which these folds were prominent were subjected to microscopic examination to determine whether muscle fibers continued into the fold. In only three instances (all fetal specimens) was circular muscle projected definitely into the fold. It is apparent, therefore, that Gerlach's fold in the adult has none of the characters of a musculosphincteric valve.

My interpretation of the import of Gerlach's valve is that its purpose is to interfere with or preclude filling of the lumen of the appendix. I do not believe that it can interfere with emptying.

Musculature of the appendico-cecal junction.—Histologic study of blocks 1 cm. in length cut from the appendico-cecal junction failed to disclose any evidence of a sphincter muscle at the site of union of appendix and cecum. A distinct thickening, however, of the circular muscle on the medial or ileal side of the appendico-cecal union was observed in 59 per cent of 250 specimens subjected to careful histologic study, which occurrence may suggest a "signet-ring" type of circular sphincter.

A variable diminution of muscle fibers continues over to the appendix from the cecum. The dispersion of the longitudinal fibers of the Taenia coli over the appendix was studied with a microdissector in 18 cases. Longitudinal muscle bands divide themselves into three layers, superficial, middle, and deep. The deep fibers attach themselves rather intimately to the circular fibers at the apex of the cecum. The decussation of the longitudinal

cecal bands about the appendix is a variable phenomenon. In somewhat more than half the cases this decussation occurs in an iris diaphragm-like manner about the base of the appendix.

Type of appendico-cecal union.—In 1885 Treves¹⁹ studied the external form of the appendico-cecal union and established four general types. Berry²⁰ and Jacobs-hagen²¹ have employed this grouping also. A summary of the type of appendico-cecal union observed in 262 specimens, 63 of which were from fetuses, is shown in table 4. It is to be noted that all the fetal appendixes and the majority of those from patients below one year of age fell into type I in which the appendix constitutes the true center of the cecal apex and a funnel shaped continuation of it. The type II cecum is similar to type I except that the cecum is sacculated evenly on both sides and there is not, as in type I, a gradual fusion of the lumina of appendix and cecum, but on the contrary, a sudden transition from the one into the other. In type III the site of appendico-cecal union is forced far medial to the left toward the ileo-cecal valve because of the greater sacculaton on the lateral aspect of the cecum. In type IV the sacculaton on the lateral aspect of the cecum has become so great that the medial wall of the cecum is practically absent, in consequence of which the base of the appendix comes to lie near the termination of the ileum.

Lymphoid tissue and glands of the mucosa.—No detailed study of the distribution of the mucosal glands or of the lymphoid tissue in the vermiform appendix has as yet been undertaken in this clinic. The lymphoid tissue in particular has been the subject of many inquiries, and considerable information is available relating to the lymphoid structure of the appendix. The vermiform appendix of man has been referred to frequently as the tonsil of the abdomen. It has been said to contain as much lymphoid tissue as the entire colon exclusive of the cecum. The lymphoid follicles have been estimated by Liebeck^{22,23} to occupy 30 per cent of the mucosal surface of the appendix, the variation lying between 8.2 and 52.8 per cent. According to Berry and Lack²⁴ the lymphoid follicles do not make their appearance until shortly after birth. In the section of fetal appendixes in which the musculature of the appendico-cecal union was studied, lymphoid follicles were encountered now and then, however. Nagoya²⁵ noted that the development of the lymphoid tissue in the appendix was fairly complete at the end of the second month of life. It attained its maximum growth between the eleventh and sixteenth years, a little later than that of the lymphoid tissue of the rest of the body. In the main, sections of the distal portion of the appendix, Nagoya found, exhibit more lymphoid tissue than do sections from the middle or proximal portion. Yet we have the impression that as far as persons of advanced years are concerned that the lymphoid tissue is present in lesser amounts toward the tip. Nagoya has counted as many as 42 lymph follicles in a circular section of the appendix from an 11 year old child. In the appendix of a man of 72 years, as few as two or three follicles were noted in a section, corresponding quite closely with the number

present in infants of four to six weeks of life. Nagoya estimates that at the extremes of life the lymphoid tissue in the appendix approximates in amount only a twentieth of that when its development is maximal in the late adolescent years.

The lymphoid tissue of the appendix is not alone sub-mucosal in location but extends often well into the mucosa, being covered by a very thin layer of epithelium, and occasionally by none at all. The absence or virtual absence of mucosa overlying the lymphoid follicles accounts in all likelihood for the occasional presence of epithelial cells, lymphocytes, and leukocytes in the appendical lumen without evidence of ulceration of the mucosal layer.

The status of the glands of Lieberkühn lining the appendical mucosa parallels quite closely that of the lymphoid follicles. The greatest number of glands Nagoya observed in specimens from the eleventh to the sixteenth years, when the growth of lymphoid tissue was greatest. In contrast with the distribution of lymphoid tissue, Nagoya observed the glands of Lieberkühn to be more numerous in the middle than in the distal segment of the appendix. In the appendix from a 16 year old child Nagoya counted 140 glands in a circular section from the mid portion and 95 in a section from the distal segment. The glandular development of the mucosa is fairly complete in infants at 5 to 6 months of life. A section of the appendix of a 7 months old fetus exhibited only 7 glands; that of a 72 year old man 20 glands.

Luminal capacity of the appendix.—The volume of the lumen of the appendix is surprisingly small (Dennis and Wangenstein¹¹). In appendixes which were not obstructed the measured luminal capacity in a number of specimens at 20 cm. of water pressure did not exceed .23 cc.; at 60 cm. pressure the highest luminal capacity was .7 cc. When the luminal capacity was measured at 100 cm. of water pressure, the volume was found to be correspondingly greater. The volume of appendixes recovered at postmortem in which the resistance to luminal perfusion is absent is, of course, greater.

An attempt was made to establish the breaking strength of the normal appendix, excised coincidentally during the course of an abdominal operation. It was found that none of three such appendixes could be ruptured by pressures as high as 2400 cm. of water (approximately 2.3 atmospheres) directly following excision. In this process a stretch of luminal capacity to about 5 cc. occurs. Gangrenous unruptured appendixes were found to break at very low pressures—one at 20 cm. of water and another at 70 cm. The presence of an inflammatory reaction in the appendical wall decreases its strength tremendously.

Reference will be made subsequently in this paper to the cecal appendage of the rabbit. It has a larger luminal capacity than the vermiform appendix of man and its wall is considerably thinner. Its breaking strength was found to be only 120 to 150 cm. of water. This point should be kept in mind with reference to the secretory capacity of the cecal appendage of the rabbit and its behavior under conditions of obstruction.

TABLE 5

	No. of Cases	Resistance to Intraluminal Outflow*			
		Average	Centimeters of Water Pressure Sustained Median	Maximum	Minimum
1. Normal	11	38.0	28	110	16
2. Interval	45	54.4	45	130	16
3. Acute	27	73.0	68	120	12**
4. Normal from cadavers	13	2.9	3	7	0

*This table also contains pressure determinations made upon the excised appendix directly after removal.

**This appendix was infested with pinworms; the next lowest readings in this group were four cases with readings of 30 cm.

TABLE 6

	No. of Cases	Resistance of the Appendix in Patients with Appendicostomy to Intraluminal Outflow			
		Average	Centimeters of Water Pressure Sustained Median	Maximum	Minimum
	12	47.7	42.0	100.0	8.75

2. PHYSIOLOGICAL BEHAVIOR OF THE APPENDIX

Resistance to luminal outflow.—When a needle is inserted through the distal end into the lumen of the vermiform appendix a resistance to inflow of fluid is encountered. The order of magnitude of this resistance is indicated in table 5. It is to be noted that vermiform appendixes removed from cadavers exhibit practically no resistance to luminal perfusion. It was highest in the acute appendixes, less in the interval group, and lowest in the normal appendixes.

It was observed that excised specimens directly after removal exhibit the same or even greater grades of resistance to outflow as in situ with the mesentery intact. If, however, the appendix is left in a container at room temperature, in 30 or 40 minutes the resistance to luminal outflow becomes minimal. This property is preserved, however, if the appendix is kept in the icebox at a temperature maintained between 2 and 7 C. The pressure in appendixes so treated, however, is about one-third of that obtained immediately postoperatively. When the appendix is excised it shrinks in length. There appears to be a fairly direct correlation between the grade of shortening and the increase in resistance to luminal outflow after excision. This resistance to luminal outflow persists after amputation of successive segments, indicating that resistance to luminal outflow is a property of each and every segment of the appendix and represents, in fact, the resistance of the circular muscle of the appendix to distention. The resistance to inflow is of the same order of magnitude as resistance to outflow.

Appendicostomy studies.—(a) Resistance to luminal outflow and suggestion of fluid secretion: Appendicostomy was established in a group of 17 cases. The majority of these had colostomy performed for carcinoma of the colon, appendicostomy being done coincidentally. Table 6 indicates that the resistance to luminal outflow is essentially of the order of magnitude of that found in the interval and normal groups in table 5. It was observed that 1 to 2 cc. of fluid could be collected daily from an unobstructed appendicostomy through a small catheter (no. 8 French urethral) tied into the lumen of the appendix. It was noted also that pressures as high

as 60 cm. of water could develop in an unobstructed appendicostomy. The latter finding in particular suggested that the vermiform appendix of man secreted fluid probably. In the collection of fluid through an inlying tube, however, it could not be gainsaid that the fluid came from the cecum. Proof of the origin of this fluid from the appendical lumen will be cited presently.

(b) Injection of bacteria: Placement of bacteria recovered from instances of acute suppurative appendicitis into the lumina of appendicostomies appeared to be tolerated without giving rise to symptoms. In the light of Aschoff's contention relating to the specificity of the infection in appendicitis one might have expected some febrile response or evidence of reaction. None was observed.

(c) Retention of foreign bodies: A single bird-shot (no. 9) was placed in the lumen of several appendicostomies. One was extruded into the colon with evidence of pain within two hours, as indicated by a roentgen film. In one instance the shot was retained for two months. Twenty-four to thirty-six hours was the more usual length of retention. Occasionally the shot was expelled through the external stoma onto the dressings.

(d) Spectrographic evidence of barium retention: The retention of barium by the appendix after the administration of barium enemas was studied on excised appendixes by a spectrophotometric method. The barium lines in the spectrum are to be found at 4554 and 2332 Angström units. In 13 appendixes removed from 6 to 790 days following the administration of a barium enema, in which the appendix was not visualized by roentgenologic examination, all failed to show spectrophotometric evidence of barium. In four other instances in which the appendix was visualized by roentgenologic examination and removed by operation after intervals of 10, 13, 93, and 257 days following the barium enema, no spectrographic evidence of barium retention was found. In six other specimens, however, in which the appendix has been visualized on roentgen examination from eight hours to six days prior to appendectomy, barium was detected by the spectrophotometric method in all. The approximate concentration of barium in the luminal contents of these appendixes varied from .05 to 10 per cent.

TABLE 7

Comparative Mortality Amongst Whites and Negroes in United States from Appendicitis 1911-1935
(Averages of annual death rates per 100,000 by color, sex, and age. Ages 1 to 74 years)*
Metropolitan Life Insurance Company, Industrial Department, 1911 to 1935.

	Age Period (Years)	Death Rates per 100,000					
		MALES			FEMALES		
		1911 to 1935	1931 to 1935	1911 to 1915	1911 to 1935	1931 to 1935	1911 to 1915
White	1 to 74	14.8	15.5	12.9	10.9	10.7	10.1
Colored	1 to 74	15.3	16.1	13.6	13.8	13.3	11.1

*Twenty-five Years of Health Progress: by Louis I. Dublin and Alfred J. Lotka, 1937.

TABLE 8

Leading Causes of Death in Certain Age Groups in Massachusetts*
(Annual average number of deaths, 1931-1935)

1 — 4 Years	5 — 9 Years	10 — 14 Years	15 — 19 Years
Pneumonia 271	Automobile accidents 70	Heart disease 65	Tuberculosis 121
Tuberculosis 57	Pneumonia 64	Appendicitis 44	Heart disease 75
Ear, nose and throat 49	Appendicitis 47	Pneumonia 37	Pneumonia 53
Automobile accidents 48	Heart Disease 47	Automobile accidents 37	Automobile accidents 53
Appendicitis 43	Ear, nose and throat 43	Drowning 32	Appendicitis 42

*Public Health Laws and Policies in Massachusetts, 1936.

In patients who were known not to have had barium for roentgen examination at any time, the removed appendixes and their contents gave no trace of barium by this method of examination.

3. PROOF OF THE SECRETORY ACTIVITY OF THE VERMIFORM APPENDIX

Method.—The pressure tracings made upon unobstructed appendicostomies of man, in which gradual increases of intraluminal tension to as high as 60 cm. of water were noted, suggested that the appendix secreted fluid.¹¹ We were somewhat reluctant to establish a direct experiment in which the base of the exteriorized appendix was ligated, but over a period of many months a suitable technic was worked out. In the first few instances a Bloch-Mikulicz type of operative exteriorization was done upon the terminal ileum and proximal colon for carcinoma of the ascending colon. The blood supply of the entire exteriorized segment was left intact, and after the early operative convalescence had been safely made the base of the appendix was ligated. The occurrence of intermittent pain with fever and leukocytosis was noted and the increasing distention of the appendix could be kept under constant observation. Incannulation for recording pressure effects graphically was done also. The process was not allowed to go on to spontaneous perforation of the appendix—the entire exteriorized segment being removed with the cautery when the necessary information had been obtained.

Our experience with this type of procedure appeared to suggest that the initial premise of secretory behavior on the part of the appendix was correct. Gradually a technic of sewing the base of the cecum to the anterior abdominal wall and ligating the base of the appendix, at the time that colostomy was done for carcinoma, was worked out. These experiments will be summarized briefly presently. Here it might be said that no patients came to harm through the performance of appendicos-

tomies which were obstructed. Obstructed appendixes were not allowed to go on to perforation, and when the secretory behavior of the appendix had been determined satisfactorily, the closed recording system was broken and secreted fluid was collected by means of an inlying cannula in the tip of the appendix in a small Wassermann glass tube at atmospheric pressure. On completion of all the necessary operative procedures for the primary surgical condition, an extraperitoneal excision was made of the appendix if it continued to secrete. The skin grows over unobstructed appendicostomy openings quite quickly if the appendix is cut off flush with the skin.

Secretory behavior of the cecal appendage in animals.—During the period that a satisfactory and safe method was being evolved of obstructing appendicostomies in man, the behavior of the cecal appendage in a large number of animals was determined. Bowers and the writer¹⁰ had noted that obstruction of the cecal appendage of the dog was unattended by inflammatory reaction if the lumen of the appendage was washed out; if, on the contrary, obstruction was established when feces distended the appendage the development of an inflammatory reaction was the rule.

The next animal in which the secretory behavior of the cecal appendage was investigated was the rabbit. This appendage of the rabbit bears in form some similarity to the vermiform appendix of man. It is, to be sure, a vermiform appendix of the cecum of the rabbit, but its cecum is a long, blind pouch. Therefore some deny that the rabbit has a true vermiform appendix. Comparative anatomists who hold to this view insist that only man and the anthropoid apes—gorilla, orangutan, chimpanzee, and gibbon—have a true vermiform appendix.

(a) Obstruction of the cecal appendage in various animals: Obstruction of the cecal appendage was established in a large group of animals, none of which gave

evidence of secretory behavior of this segment of the gut. In the majority of this number, more than one animal was available for most of the investigations, and in most instances protracted graphic tracings were made of the pressure relation within the obstructed cecal appendage. The list of these animals in which the cecal appendage gave no evidence of secreting fluid or developing sustained intraluminal pressures under conditions of obstruction follows. Twenty-six species of animals were studied:

- Fowl: duck, goose, chicken, pigeon.
- Carnivorous mammals: dog, red fox, cat, tiger.
- Rodents: gray squirrel, striped gopher, rat, guinea pig, porcupine.
- Domestic: hog, sheep, calf.
- Monkeys: Marmoset, ring-tailed, macaque.

The skunk, raccoon, and bear were explored but these animals had no cecal appendage. Dr. George A. Barnett of Chicago kindly put at our disposal several excised specimens of the ileo-cecal segment from various animals. The walrus and baboon (*Doguera* type) were found to be without a cecal appendage.

(b) Obstruction of the vermiform cecal appendage of the rabbit: A large number of observations of diverse kinds have been made on the vermiform cecal appendage of the rabbit. Ligation of the base has been followed by rupture as early as 3½ hours after the establishment of obstruction. The majority of animals (75 per cent) after 10 hours will exhibit perforation. A gangrenous process was observed quite constantly in animals in which obstruction had been present for 8 hours.

Incannulation of the rabbit's vermiform appendage is followed almost invariably by a fairly high secretory pressure, far more constantly than in man's appendix, in which occasionally no evidence of secretory pressure is observed. Pressures of 60 to 70 and occasionally 90 cm. of water are the rule. The highest sustained pressure observed in the rabbit is 136 cm. of water, 10 cm. higher than the highest pressure in man.

In an earlier publication the impression was lent, on the basis of a much smaller series of animals, that the administration of cathartics caused earlier perforation, and probably through the agency of increased secretion it was reasoned. As a matter of fact, a larger series shows that the amount of fluid secretion in the obstructed vermiform appendage of the rabbit is not significantly different from the obstructed control without administered cathartic or hypertonic intravenous saline solution. Further, the time of perforation is dubiously accelerated by the administration of cathartics. The hazard inherent in their use appears to lie in breaking a seal which the perforated vermiform appendage has established with adjacent tissues; cathartics in augmenting contractile activity of the gut preclude sealing of the perforation and enhance the danger of a wider spread of the spilled contents from the obstructed lumen.

Wells²⁶ of London concludes with reference to the rabbit as follows: "Obstruction to the lumen of the appendix does not, in the rabbit, cause appendicitis. Such a procedure will under certain conditions cause a mu-



Figure 1

(a) Method of collecting fluid from the vermiform cecal appendage of the rabbit in a condom-type of balloon in the peritoneal cavity. Note the lack of reaction in the appendage.

(b) The appendage of another rabbit that perforated somewhat more than 5 hours after obstruction. Note the site of perforation near the mesentery.

(c) Histologic reaction in rabbit's appendage, 6 hours after the establishment of obstruction. Section taken from near the site of rupture. A cellular invasion of the entire wall, largely polymorphonuclear in character, has occurred. The mucosa has been lost in part by ulceration.

cocele of the appendix. Obstruction of the lumen of the appendix, when the mucous membrane is damaged, is always followed by acute inflammation of the appendix and death of the animal. It is immaterial whether the obstruction is produced by a ligature or by a foreign body."

Wells' interesting experiments received favorable comment in an editorial in the *Lancet*.²⁷ The fallacy of Wells' work lies, however, in his failure to open his animals early after the establishment of obstruction. Wells established obstruction in ten rabbits without ligating the vessels. In eight of these "at about the end of the second week in every animal a lump was felt in the abdomen." Two of the ten died three days after op-

eration with an acute appendicitis and peritonitis. Wells explains this occurrence in the following manner: "It seems reasonable to suppose that there was some lesion of the mucous membrane, pre-existing or more probably accidentally imposed at the time of operation."

(c) Secretory capacity of the vermiform appendix in anthropoid apes: Two species of anthropoid apes were available for investigation, namely, two gibbons and three chimpanzees.* The gibbon was found to have an infantile type of vermiform appendix. The luminal stretch determined under measured pressures, however, was about twice that of man, indicating a thinner muscle layer. A satisfactory tracing was made in both gibbons, the pressure recordings extending continuously over about 48 hours in each animal. One developed a maximal intraluminal pressure of 18 and the other 19 cm. of water. In neither instance was the maximal pressure sustained for long. Neither appendix exhibited histologic evidence of leukocytic invasion of the walls of the appendix. Serositis of the exteriorized segment was, of course, present. These sections constituted excellent controls in that no leukocytic invasion of the appendical wall attended incannulation when a sustained secretory pressure failed to develop.

One of the three chimpanzees died of a mucous plug in the trachea about ten hours after the start of the experiment. An extensive tuberculosis throughout lungs and peritoneum was observed at necropsy. The intraluminal pressure in the appendix during these ten hours had built up to 42 cm. of water pressure. Microscopically, diffuse leukocytic invasion of all the walls of the appendix was observed. In the instance of one chimpanzee the highest pressure recorded was 76 cm. This pressure was reached 20 hours after the start of the experiment and was maintained without further increase for 8½ hours. The pressure gradually fell then to 55 cm. and the experiment was terminated by excision of the vermiform appendix 33 hours after the experiment was begun. Microscopically, rupture was found in the proximal portion which was beneath the skin. Fluid had seeped out with the occurrence of rupture, accounting for the fall in pressure. The typical picture of leukocytic invasion of all the layers of the appendical wall was observed on histologic study. The luminal stretch under measured pressures of the intact appendix at the beginning of the experiment was about the same as in man.

The third chimpanzee built up an intraluminal pressure of 106 cm. of water 36 hours after the start of the experiment. It was maintained for three hours when gross rupture with escape of fluid occurred. The microscopic picture of a diffuse leukocytic reaction involving the entire appendical wall had been produced by the secretory activity of the obstructed vermiform appendix. The appendixes of these three chimpanzees would fall

into group 2 of Treves' classification with reference to the external form of the appendico-cecal union.

The spontaneous occurrence of appendicitis in anthropoid apes is well known²⁸ and has been discussed previously.¹⁰

(d) Obstructed appendicostomies in man: Twenty-two such procedures have been made during the last two years. In eight of these, a sustained pressure of less than 20 cm. of water was developed. In two of these eight no evidence of increased intraluminal pressure attended incannulation of the exteriorized obstructed appendix. Ligature of the base was made with fine plain catgut in each instance and it is possible that the occlusion was not secure enough to occlude the lumen completely. Yet, in the light of evidence of fluid secretion obtained in unobstructed appendicostomies, this does not appear to be a cogent explanation. In nine instances sustained pressures in excess of 40 cm. of water pressure were recorded. In seven of these instances the pressure was sustained above 85 cm. There appeared to be no correlation between age and evidence of fluid secretion. The highest pressure observed, 126 cm. of water (approximating the systolic blood pressure), was noted in a man of 68. In another man of 70, 92 cm. of water pressure was developed within 14½ hours and was sustained for 7½ hours, at which time the cannula was withdrawn. In the remaining five appendicostomies, pressures intermediate between 20 and 40 cm. attended obstruction of the exteriorized appendix.

That the fluid accumulating in the appendixes of man, chimpanzee, and rabbit is a true secretion and not a filtrate is indicated by the high secretory pressure developed under conditions of obstruction. Also, the intraluminal pressure is higher than the tissue tension measured in the substance of the appendical wall directly after excision. If the fluid were a filtrate and not a secretion the reverse would be true, namely the tissue pressure would be higher than the intraluminal.

4. NATURE OF THE FLUID SECRETED

The tremendous secretory capacity of the rabbit's vermiform appendage has afforded an excellent opportunity for the collection of fluid. The voluminal capacity of the rabbit's cecal appendage at the time of bursting is in the neighborhood of 16 to 20 cm. Twenty cm. of fluid may be collected usually in about six hours time in an attached balloon allowed to remain in the peritoneal cavity. The fluid is thin and serous with free admixture of mucus. The pH of the fluid collected from the vermiform appendage of the rabbit when its base is ligated has varied from 8.78 to 7.12 and is usually distinctly on the alkaline side. Sucrase, maltase, and erepsin have been shown to be present not infrequently. Attending the intravenous administration of hypertonic saline solution, the digestion of egg albumin by fluid removed from an obstructed rabbit's vermiform appendage was noted, a finding which would suggest the presence of a more active proteolytic ferment than erepsin.*

*It is a pleasure to acknowledge here helpful suggestions from Dr. John F. Fulton, Sterling professor of physiology at Yale University, relative to the anesthesia problem in dealing with chimpanzees. I am deeply obligated to Mr. Fred M. Truax, commissioner of parks, playgrounds, and public buildings in Saint Paul and to his staff at the Como Park Zoo for invaluable help in prosecuting the studies on the functional behavior of the appendix of many of the animals listed and the apes mentioned here.

*When the influence of bacterial activity is ruled out, however, by Berkefeld filtration, it would appear that no enzymatic action persists.

The pH of fluid collected from obstructed appendixes in man was found to vary between 6.0 and 8.28 with a definite tendency to a lower pH than in the fluid from the rabbit. Mucin was found on all examinations and the presence of amylase and erepsin was demonstrated.

Insomuch as an active secretory behavior in the vermiform appendix is a wholly unexpected finding in the light of the usual concept of the function of this segment of the gut, it would be fitting if a morphologic answer would be forthcoming to account for this behavior. A careful histologic study of the appendical epithelium with differential stains would appear to be in order. Schmidt²⁹ a number of years ago called attention to the rather frequent occurrence of Paneth cells in the depths of the crypts of Lieberkühn. Their function is, however, yet not definitely known. It is possible that there may be ectopic secretory epithelium in the appendix, but it would appear more likely that the appendix may partake of the functional behavior of segments of the small intestine as far as secretion is concerned.

5. OBSERVED HISTOLOGIC REACTIONS IN OBSTRUCTED APPENDIXES WHICH SECRETE FLUID

This portion of the problem in itself is an undertaking of some magnitude. A review of this phase of the work has not been completed, but the varied structural changes observed in the architecture of the appendical wall in appendicitis developing spontaneously in man, it would appear, can be duplicated by luminal obstruction. The time element relates itself intimately to the character of the cellular reaction provoked. In the rabbits in which perforation followed within three or four hours after ligation of the base of the appendix, the resultant leukocytic reaction was minimal usually and concerned only the mucosa and the subserous coat. Whenever, however, perforation occurred only after the elapse of 10 to 14 hours, a gangrenous process with pronounced cellular reaction involving all the walls was observed. In the appendixes of man in which great increases of intraluminal pressure attended obstruction of the exteriorized vermiform appendix, erosion of the mucosa and an intense leukocytic invasion of all the walls occurred, largely polymorphonuclear in character. It has been mentioned already that a diffuse cellular reaction throughout the entire wall of the appendix was noted in the three chimpanzees, all of which developed sustained intraluminal pressures. In the gibbons, on the contrary, in which no evidence of fluid secretion was observed, the appendixes were normal histologically save for serositis attending the exteriorization. In rabbits, when the intraluminal pressure was not allowed to exceed 6 cm. of water by removal of successive increments of secreted fluid, histologic structural changes were not observed. In a number of instances in which the intraluminal pressure was allowed to rise to 20 cm. of water and maintain itself at that level, one acute diffuse process was observed in the wall on histologic study, in another gangrene occurred, and in one instance perforation was observed.

Gram-Weigert tissue stains made of the rabbit's vermiform appendage show that bacteria are present normally

in the submucosal lymphoid tissue. That all lymphoid tissue may harbor bacteria under normal conditions is conceded quite generally. In the appendix of man bacteria were observed occasionally below the surface epithelium, but by no means as commonly as in the rabbit. Both Waetzold³⁰ and Bowers³¹ have noted that bacteria may be demonstrated readily in the wall of the appendix if the excised appendix is not fixed immediately. Bowers observed a high incidence of bacteria in the tissues of the appendical wall of man in acute appendicitis. When one contemplates the anoxic effects of high (secretory) intraluminal pressures upon the tissues and the encouragement lent bacteria by this agency, as well as the disseminating force of increased hydrostatic pressure, it is apparent that the infective factor is invoked early by obstruction of the appendical lumen.

Much remains to be learned concerning the cellular nature of defence reactions in general—to this an evaluation of the early histologic processes observed in spontaneous appendicitis in man is no exception.

REVISION OF PATHOLOGISTS' CONCEPT OF APPENDICITIS NECESSARY

All pathologists with the exception of Aschoff and his followers concede freely that some cases of appendicitis have their origin, at least in part, on the basis of obstruction. In fact many pathologists would agree that a large number of cases of acute appendicitis are solely obstructive in origin. What the origins of those cases may be which fail to exhibit definite pathological evidence of obstruction is by no means a matter of common agreement.

Pathologists recognize essentially the following types of disease:³²

1. Appendicitis in which the inflammatory reaction is limited to the mucosa (catarrhal, "primärinfekt").
2. A diffuse inflammatory process involving all the walls (diffuse, phlegmonous, ulcerative, gangrenous, perforative).
3. A subserosal perivascular leukocytic invasion which may occur independently or accompany mucosal lesions.
4. Healing phases of acute appendicitis, exhibiting granulation tissue reactions and lumen obliteration of varying grades, displacement of lymph follicles^{7,33} into muscular and subserous coats, invasion and replacement of structure of appendical wall with fat and mucocele formation.

The more severe grades of appendicitis, such as diffuse leukocytic invasion of all the walls with attendant phlegmonous, ulcerative, gangrenous, or perforative changes, may all be reproduced experimentally by luminal distention. The lesser reactions in which leukocytic invasion is limited to the mucosa and subserosa are observed also in those instances of induced obstruction in which the secretory pressure does not maintain itself at a high level. Seng³⁴ has shown that there is a generous network of lymphatic vessels going out from the mucosa of the appendix directly to the subserous coat, a finding which is not uncommon apparently in the intestinal canal as a whole.³⁵ The occurrence of perivascular infiltration around the vessels in the subserosa following low in-

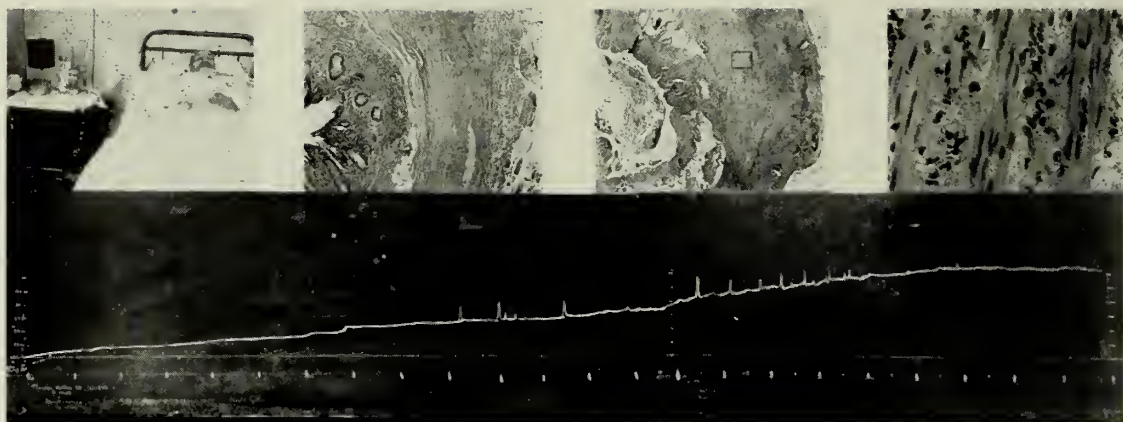


Figure 2

(a) Tracing being made upon Mr. T. W., U. H. No. 665959, aged 68. The appendix has been exteriorized and ligated at its base. The slope of the rise of the pressure is indicated on the smoked drum. The colostomy is shown on the left, and the patient is apparently quite comfortable.

(b) A control section from the distal portion of the appendix removed at the time of operation. (Magnification 60X).

(c) Section (magnification 30X) from portion of the appendix beneath the skin taken when cannula was removed, 22 hours after the establishment of obstruction; the pressure had risen to 126 cms. of water. There is a loss of some of the surface epithelium with free extrusion of cells into the lumen. There is a dense leucocytic invasion of the wall. It is to be noted that despite the presence of some fat in the submucosa that the secretory activity of the appendix was great.

(d) Section through muscle shown in square in C, (magnification 500X). Note the polymorphonuclear infiltration.

(e) The pressure tracing—the slope of the rising pressure is indicated. A pressure of 126 cms. water was reached 22 hours after obstruction.

creases of intraluminal tension in the appendix is understandable therefore.

The "primärintekt" which Aschoff has described shades off on the one hand into a process of extension of epithelial cells through the goblet cells of the crypts of Lieberkühn, with occasional actual loss of the surface epithelium, on the other hand into leukocytic invasion of the appendical wall. The first is certainly a normal reaction. And whereas the collection of leukocytes in the appendical lumen, in which the appendix is otherwise grossly and histologically normal, is now and then considered as evidence of early acute appendicitis, it is in all probability a normal occurrence. We have observed it in the vermiform appendix of man and this occurrence was noted in the distal end of the appendix excised as a control section in a chimpanzee before obstruction and incannulation.

The migration of leukocytes through intact epithelial cells of the entire digestive tract is well known. Jassinowsky^{36,37} has studied this phenomenon in the rabbit and finds that the migration of cells in all parts of the digestive tract other than the mouth (where it is essentially polymorphonuclear in character) is lymphocytic in type. The migration of lymphocytes into the appendical lumen he found to be the greatest per square unit of surface in the entire intestinal canal. By irrigating the surface with saline solution, he estimated that 14,500 lymphocytes per minute per square centimeter of surface were cast into the lumen. The desquamation of the surface epithelium was less intense in the appendix, where it was of the order of magnitude of 1,500 per minute per square centimeter of surface as contrasted with the ileum where it was 8,000 and in the upper jejunum where it was 7,300.

The character of this cellular migration we plan to study in appendicostomies in man.

From the studies which have been made upon the nature of the histologic reaction attending obstruction of the vermiform appendages of man, chimpanzee, and rabbit, it would appear that all the varieties of acute appendicitis recognized and observed by the pathologist may be produced experimentally by obstruction. The secretory pressure produces tissue injury and leukocytic invasion with pus formation and all the varieties of appendicitis observed clinically may occur in consequence.

The pathologists' reluctance to accept the obstructive origin for certain types of appendicitis is occasioned, in part, probably by failure to find an obstructive mechanism even though a thin wall and a dilated lumen speak forcibly for an obstructive origin. What may have become of the obstructing agent? If a fecalith, the possibility of its having become dissolved by the ferments of the secreted fluid and broken up by the contractions of the appendical wall would appear to be good, at any rate.

Further, amongst the gangrenous group in which no obstructive agency is found and micrometric studies of the wall show the latter somewhat thick and the lumen small, it is not unlikely that these findings may be occasioned in part by the lapse of time after extrusion or solution of the obstructing fecalith. For in the rabbit, anyway, if the obstruction is released in a gangrenous obstructed appendix (cutting the occluding ligature, which has been tied down, upon an encircling rubber tube), the findings described above are observed not infrequently.

THE ORIGIN OF APPENDICAL OBSTRUCTIONS

The small lumen of the appendix which exhibits normally a real resistance to outflow indicates how substances which enter the appendical lumen may find difficulty in leaving. In addition, kinks and sharp bends in the axis of this vermiform structure as well as retrocecal fixation may constitute physical handicaps to ready evacuation. Extrinsic bands and intrinsic strictures, the latter the result of previous ulceration extending well into the submucosa, likewise may obstruct the appendix. Appendicoliths and the lymphoid tissue of the appendix itself constitute probably the most important agencies in the development of obstruction.

Any infection in which swelling of the lymphoid tissue of the appendix occurs may bring about closure of the lumen. The appendical occlusions which occur during measles, scarlet fever, and other infectious fevers are likely to be brought about through such an agency.

Nature of fecaliths.—Appendicoliths are formed in situ in all probability within the lumen of the appendix. The best evidence of this is that many are so large that they could only with the greatest difficulty have been forced into the appendix from the cecum. Most appendicoliths contain a central nucleus of undigested cellulose. Neumann³⁸ claims that swallowed hairs constitute a common nucleus of appendicoliths. Schuberg³⁹ claimed at one time that the greater incidence of appendicitis occurring in men than in women could be explained on the basis of "beard-chewing." Beards and mustaches are no longer very common, yet appendicitis persists as a more frequent malady amongst men than women.

Appendicoliths may be hard and whitish or soft and brown in color. Mucus is undoubtedly an important constituent of an appendicolith. The lamination of appendical concretions which is quite constant is occasioned in all likelihood by the continued addition of mucus to the initial fecal body. The calcium which imparts hardness to the appendicolith arrives in the appendix from the main channel of the digestive tract, but is present also in the fluid secreted by the obstructed appendix.

In the series of acute cases of appendicitis studied recently by Bowers³¹ from this clinic, a fecalith was found to be present in 67 per cent of the cases; in 16 per cent of this number there were multiple appendicoliths.

The appendicolith is undoubtedly the most important single agency in the genesis of obstruction of the appendical lumen. Only Aschoff and his followers deny it any significance. From the Friedrichshain Hospital in Berlin, Neumann reports having found appendicoliths in 544 out of 1847 excised appendixes (29.4 per cent). There were in this group 50 appendixes from children under 6 years of age. The incidence of appendicoliths in this group was 56 per cent and in 42.9 per cent of this number hairs were present in the appendical concretions. The German surgeon Riedel⁴⁰ accords the fecalith considerable importance in the genesis of appendicitis.

Filling and emptying of the appendix.—When the manner in which the appendix fills is understood better, the development of appendical concretions will be more

intelligible. The mucosal folds exist over the appendical orifice probably to preclude entry of intestinal content into the appendical lumen. Fluid is secreted and may be collected from an unobstructed appendicostomy through its distal opening upon the anterior abdominal wall. Lead bird-shot placed in the appendical lumen may be extruded upon the anterior abdominal wall, but more often are expelled into the cecal lumen. Spectrophotometric studies upon excised appendixes, in which prior to operation administered barium was visualized within its lumen, have shown that barium may be retained by fairly normal appendixes for as long as six days. In stenotic appendixes barium may be retained for months.

Sir Arthur Keith⁴¹ has described the cecocolonic sphincteric tract, a functional sphincter which he finds on the ascending colon about 5 cm. above the entry of the ileum into the cecum. Though not recognized by anatomists, a functional sphincter has been described at this site on the bowel by roentgenologists (Hirsch,⁴² Biedermann,⁴³ Morse⁴⁴). We have observed that the intraluminal pressure during digestion may be surprisingly high in this segment of the colon. Contractions upon a small balloon passed down into the cecum with a diameter of about 2 cm. when distended have been recorded with an amplitude of 20 to 30 mm. Hg. (27 to 40 cm. of water pressure). When pain is evoked pressures in excess of 50 mm. Hg. have been noted. The competency of the ileo-cecal valve and sphincter against regurgitation into the ileum has been well established. It is not difficult to understand how the vermiform appendix would fill readily in the presence of a high hydrostatic filtration pressure in the cecum if a functional sphincter were present on the ascending colon.

THE MYTH OF APPENDICITIS AND DIET

One need not look far into the literature of the pathogenesis of appendicitis to observe that it is believed widely that appendicitis is a disease of civilization and culture, in which diet and lack of physical activity are the chief determinants. Amongst other foods the following have been alleged to play an important role in the causation of appendicitis: increased consumption of meat and especially frozen and preserved meats, bananas, increased consumption of sugar, and the eating of inadequate amounts of cellulose. The strange thing is that bits of cellulose constitute often the central nucleus of appendicoliths which play so important a role in the genesis of acute appendicitis.

The source of the myth that appendicitis is a dietary disease would appear to have had its origin in occasional reports emanating from China relating to the rarity of appendicitis, and similar reports have since come from other parts of the world where the whites are in the minority. Anyone who will take the time to read the papers of Birt⁴⁵ (Shanghai and Middle China), Gibson⁴⁶ (Hong Kong), Russell⁴⁷ and Snell⁴⁸ (Soochow), Hedblom⁴⁹ (Shanghai), LeConte⁵⁰ (Cochin China), Phister⁵¹ (Peiping), and the reviews of Heine⁵² and Elsa Uhlendorf⁵³ cannot escape the impression that appendicitis is far more common in that country than we are taught to believe. Whereas the diet of the Chinese has apparently remained essentially the same for

centuries, appendicitis is being more frequently discovered as the Chinese accept the medicine of the white physician.

The same can be said for other countries. Roegholt⁵⁴ (Java), van der Gugten⁵⁵ (India), Barry and Crump⁵⁶ (Southern India), and Reyes⁵⁷ and Burdette⁵⁸ (Philippine Islands) report that appendicitis is a not uncommon surgical disorder. Burdette says that he was unable to detect the slightest anatomical difference in the appendixes of Americans, English, Japanese, Chinese, or the Malays and that no one race of people was more disposed to appendicitis than another. T. J. Dry,⁵⁹ now of the Mayo Clinic, writes me that he saw the late complications of appendicitis in the natives of East South Africa, near Cape Town, not uncommonly in his student days there. In the northern part of southern Rhodesia, where the colored population lived under less civilized conditions, Dry states that he saw no cases of acute appendicitis. That the mortality of appendicitis in Japan and South Africa is not negligible is to be noted in the summarical mortality table of appendicitis by country (table 1).

It is also not without interest that the mortality of appendicitis amongst the colored people (Negroes) in the United States is higher than amongst the whites. Table 7, on the following page, from Dublin and Lotka's⁶⁰ computation (Metropolitan Life Insurance Statistics) indicates the death rate per 100,000 was higher during each period of study for both the colored male and female group as compared with the whites for the same ages (1-74).

Something which we often fail to remember is that excision of the appendix was a rare operation in American and European hospitals before 1893. To be sure an appendical abscess was incised now and then. When Bull⁶¹ made his report in 1873 he had only eight instances of incision of appendical abscess to report from the world's literature (nine including the first case of Mr. Hancock⁶² of London, which Bull overlooked). Anyone interested in tracing the development of the frequency with which appendectomy was done in hospitals in the early years should examine Vale's⁶³ tables. Such an examination may in part explain why appendicitis does not appear to be so common a surgical disorder in countries where modern hospitals are relatively recent innovations. In a large number of well-known American hospitals and clinics of that day, the vermiform appendix had not been removed as late as 1893.

APPENDICITIS—A PROBLEM OF THE PUBLIC HEALTH*

In 1935 there were 16,142 deaths from appendicitis in the United States (Mortality Statistics United States Census). It ranked as the fifteenth most important cause of death including all ages. Among the policy holders of the Metropolitan Life Insurance Company between the ages of 1 and 74, a study extending over a

Mortality from Appendicitis in the United States, Census 1935.
Grand Total (16,142)

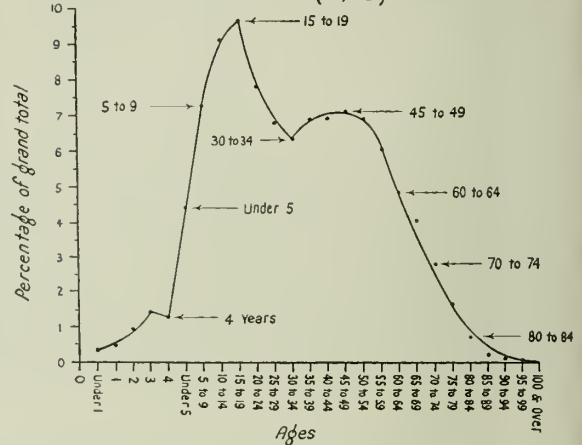


Figure 3

The plotted mortality curve of appendicitis by years in the United States in 1935. The highest mortality is between the years of 15 to 19, when 10 per cent of all deaths occur. It is to be noted, however, that at least 7 per cent of all deaths occur in each succeeding 4 year period until the middle fifties are reached.

period of a quarter of a century (1911 to 1935) showed that appendicitis was the ninth cause in the order of the number of deaths. Among gainfully employed men between the ages of 15 and 64, appendicitis ranks as the eighth cause of death. Appendicitis is accountable for more deaths annually in the United States than cancer of any one organ save the stomach. The mortality statistics for the United States indicate that when the younger age groups from 5 to 19 alone are considered, appendicitis is found to be uniformly throughout these years one of the agents of death which exacts a high toll. The accompanying table 8 from a Massachusetts compilation discloses that appendicitis is the second to fifth most important cause of death during these years, a finding with which the mortality figures for the country at large are in general agreement.

Whereas the greatest frequency of the disease occurs during these years, it is startling to observe that the mortality of appendicitis continues at about the same level over a number of years. This means that despite its lessened frequency of occurrence the percentile mortality of the disease for those years has actually increased materially.

Among all causes of death at all ages appendicitis ranks next to syphilis, including all forms of that disease. Whereas the economic burden of the death toll in appendicitis does not weigh so heavily upon society, in that its victim does not become a public charge as is usually the case with general paresis, yet appendicitis commands undoubtedly a toll of more useful lives. This loss of useful lives from appendicitis is the more to be regretted since deaths from appendicitis are avoidable if operation is undertaken early. The mortality is essentially one of procrastination. And whereas the lay public may feel that improvements in surgery may readily make adequate amends for this loss of opportunity, we know very well that our accomplishment in the management

*It is a pleasure to acknowledge worthwhile suggestions from Dr. William P. Shepard of the Metropolitan Life Insurance Company and Dr. Gaylord Anderson, professor and head of the department of preventive medicine and public health of the University of Minnesota, in finding helpful sources on mortality figures.

of peritonitis is little better than it was at the dawn of the era of abdominal surgery. Whereas more lives of neglected cases may be salvaged by conservative management, the only way to stop this wanton sacrifice of lives is to have patients with acute appendicitis come to operation early.

The entire medical profession must be alive to the potential danger of this sword of Damocles which hangs over everybody's head who retains his vermiform appendix. A public health program of instruction must be undertaken to acquaint communities at large with the hazards of appendical obstruction. Mothers must be enjoined not to give cathartics in the presence of abdominal pain. Patients must be instructed not to medicate themselves or consult their pharmacists but their physicians for abdominal pain, and shortly after its onset. School nurses as well as physicians must learn that the absence of fever does not militate against appendicitis when abdominal pain is present. And finally the alleged health restorative power of cathartics must not be broadcast over the radio or proclaimed by the pharmacist over the counter.

It is decidedly discouraging to contemplate, however, that the mortality of appendicitis is higher by occupation among physicians and surgeons than it is in the population at large. In the group of gainfully employed men between the ages of 15 and 64, Jessamine Whitney⁶⁴ found by a study of the mortality of ten states from the mortality statistics of the United States Census that the death rate for the group as a whole was 20.7 per 100,000. For physicians and surgeons the rate was 22.1. Nowhere is the proverb of "physician heal thyself" more applicable!

THE FREQUENCY OF APPENDICITIS

The studies of Aschoff⁶⁵ upon necropsy material indicate that of persons dying in the sixth and seventh decades of life, 75 to 80 per cent exhibit evidence of previous disease in the appendix. Very few persons who live the Biblical three score and ten reach the grave with a normal appendix.

Kraft⁶⁶ of Denmark finds that about 2 per cent of Denmark's 3,500,000 people surrender their appendix to the surgeon yearly. In the Friedrichsberg Hospital, which serves a community of 100,000 people, where he works the incidence of appendectomy is the same.* Kraft believes that about 10 per cent of people during their life time have at least one acute attack of appendicitis. Of those who recover spontaneously from an attack, the recurrence rate of attacks he estimates at 30 per cent. It is interesting that in his group of cases appendicitis was as frequent in the female as in the male. R. E. Buirge,⁶⁷ my associate, has been making an inquiry relating to the number of persons who have had their appendix excised. In a group of more than 27,000 persons comprised of school children, nurses, men in C.C.C. camps, and patients admitted to the University of Minnesota Hospitals, he found that 8.6 per cent admitted having had appendectomy. The lowest incidence was among school children 2.5 per cent and the highest among a group of 150 nurses 28.7 per cent of which number had submitted to appendectomy. In a statistical

study of appendectomy in the Civilian Conservation Corps, Rudder⁶⁸ found the incidence of appendicitis in a group of 200,000 young men between the ages of 18 and 25 to be 3 per 1,000 per annum. Wevill and Wallace⁶⁹ estimated on the basis of the population of Scotland and an analysis of 8,000 cases of acute appendicitis treated at the Royal Infirmary at Edinburgh over a 10 year period that the maximal incidence of the disease for the male was 12 years and for the female about 18 years. One in 200 (500 per 100,000) boys of 12 years were appendectomized annually for acute appendicitis and one girl out of every 230 at the age of 18 years. Gundel and Mayer⁷⁰ have discussed interesting aspects of the appendicitis problem in Germany.

Alleged seasonal occurrence of appendicitis.—A seasonal incidence of appendicitis has been claimed by a large number of writers, particularly those who insist on a causal relationship between infection of the upper respiratory tract and appendicitis. That infection may cause swelling of the lymphoid tissue which in turn may obstruct the lumen of the appendix has been admitted already. Bowers³¹ was unable to detect any suggestion of seasonal prevalence of appendicitis in his group of cases. In a group of 8,000 cases of acute appendicitis reported by Wevill and Wallace⁶⁹ from Edinburg, the occurrence of seasonal occurrence is denied. A study of the mortality of appendicitis in this country from month to month lends no support to the belief that appendicitis is a seasonal disease.⁷¹

Rostowzew⁷² was unable to establish any correlation whatsoever between the occurrence of appendicitis and influenza in St. Petersburg. His graph indicates little variation in the frequency of appendicitis and considerable fluctuation with reference to influenza. Renn⁷³ came to the same conclusion with reference to tonsillitis and appendicitis.

NECESSITY FOR REVISION OF THE CLINICIAN'S CONCEPT OF APPENDICITIS

Whereas there may be other causes of appendicitis than occlusion of the lumen, the only one definite tangible agency which will bring about the sequence of events which terminates in diffuse leukocytic invasion of the walls of the appendix, gangrene, or perforation is obstruction. Inasmuch as all the histological varieties of the disease recognized by the pathologist can be reproduced by occlusion of the lumen in man or in animals (chimpanzee and rabbit) in which the appendix secretes fluid actively, it is reasonable for the clinician to consider appendicitis as the sequel of luminal obstruction.

With such a consideration in mind it is necessary to resurvey the symptoms and physical findings which are regarded generally as being typical of the disease. The dicta of Murphy, namely pain, nausea and vomiting, abdominal sensitiveness, fever, and leukocytosis, have been accepted almost universally as clinical desiderata of the disease. The teachings of the late Sir David Wilkie⁷⁴ with reference to "appendicular obstruction" should prop-

*Barnes estimates that somewhat more than a million and a half appendectomies are done yearly in the United States (1.18 per cent of the total population). He believes that half again as many more should have had appendectomy. Texas State J. Med. 34:360, 1938.

erly be applied to all cases suspected of being appendicitis in the light of the significance of luminal obstruction in bringing about various end effects of the disease. One can no more foretell the secretory capacity of an obstructed appendix than he can the progress of the disease by interpreting the physical findings.

In so far as appendicitis is not an infection primarily, the inflammatory features of the disease are absent altogether usually in the beginning. Therefore the pulse, temperature, and leukocyte count may all have fairly normal values for some time after the onset of the disease.

Appendicitis is essentially a closed-loop obstruction in which a very short segment is concerned, with no interference with continuity of the main intestinal channel. The only early findings in a closed-loop obstruction are intermittent crampy pain and local tenderness. Vomiting may be absent altogether. Elevation of the temperature, hurrying of the pulse, and leukocytosis are evidence that the infective characters of the disease have been set in motion.

It is equally as necessary that the physician reorient himself in the subjective and objective findings of the disease as it is that the pathologist revise his concept of appendicitis. The potential hazard of all closed-loop obstructions needs no amplification.

NEED OF REVISION OF INDICATIONS FOR EXCISION OF THE VERMIFORM APPENDIX

In the light of the nature of the origin of appendicitis, it is apparent that sacrifice of the appendix should be made on lesser indications. If all persons who exhibit evidence of previous appendical disease in the upper brackets of life (75 to 80 per cent according to Aschoff⁷⁵) actually were threatened at some time during their life by an acute attack, there might appear good reason to establish a new surgical covenant and, unlike circumcision contracted with Abraham, one binding on both sexes. There appears to be no good evidence now available, however, which indicates that all persons whose appendixes reveal traces of disease have actually suffered from appendicitis. The surgeon sees over himself the threatening shadow of the pathologist who is accustomed to think in terms of disturbances of morphology rather than function. In consequence the surgeon has become hesitant in excising the appendix on lesser indications, though he knows very well that no constant correlation exists between a clinical appraisal of the severity of an attack and progress of the process in the appendical wall. Reports like those of Charles W. Mayo⁷⁵ and Rea and Kleinsasser⁷⁶ are reassuring. In patients not admitting acute attacks but complaining of right lower quadrant pain, in whom examination excluded other palpable causes, appendectomy was followed by relief of pain in 70 per cent of Mayo's cases and in 78 per cent of Rea and Kleinsasser's cases. Sources for abuse and disappointment in promiscuous appendectomy are obvious. The very occurrence of the occasional "adhesion-former," who is started on a life of chronic invalidism by excision of a fairly innocent appendix, constitutes alone a serious deterrent to operation without good in-

dication. Nevertheless physicians and surgeons must be less restrained in their indications for operation in the patient whose symptoms suggest acute appendicitis. Marsch⁷⁷ and Aschoff⁷⁸ on analyzing independent data suggest that the mortality of the medical management of acute appendicitis is somewhere between 6 and 7 per cent. Surgeons with alert and knowing consciences are not likely to advise operation without just cause.

Those who affect to believe in the inheritance of acquired characters may be at pains to tell us that the removal of the appendix through a few generations of people might succeed in the anatomic elimination of this useless member. Let me remind you, however, that the covenant of circumcision kept faithfully since the time of Abraham save for the dereliction of Moses in the wilderness, but renewed promptly by Joshua, has failed to produce a race of male infants without a prepuce. And Matthew enumerates 42 generations alone between Abraham and Christ! Unfortunately, therefore, there appears to be no safe method of promise other than surgical intervention to eradicate the dangers of an obstructed vermiform appendix.

SUMMARY

The vermiform appendix of man is a narrow diverticulum of the intestinal canal; its luminal capacity at a pressure great enough to overcome the resistance to inflow (60 cm. water) is about 0.5 cc.; its orifice is covered in whole or in part by a mucosal fold which contains no muscle fibers, in about 80 per cent of instances. There is little evidence of an anatomic sphincter muscle at the site of appendico-cecal union. In infants, a funnel shaped type (Treves' type I) of union exists between vermiform appendix and cecum. In children more than one year of age and in adults, Treves' type III is the most frequent variety. The lymphoid tissue and glandular epithelium parallel one another closely in growth and exhibit the greatest development between the eleventh and twentieth years. These anatomic features of the appendix are such as to favor retention of material which once enters it.

Proof is offered herein to indicate that the vermiform appendix of man and the chimpanzee, as well as the vermiform cecal appendage of the rabbit, secrete fluid.

Evidence is offered to indicate that the vermiform appendage of the rabbit will perforate quite regularly after 10 to 14 hours of obstruction, and frequently considerably sooner. Rupture was observed in the vermiform appendix of one chimpanzee 33 hours after obstruction and occurred in another after 39 hours. Obstruction of the exteriorized vermiform appendix of man is attended usually but not regularly by the development of a high intraluminal pressure.

The highest record of sustained pressures attending incannulation of the obstructed appendix has been for man 126 cm. of water pressure, rabbit 136 cm., and chimpanzee 106 cm. In two gibbons the highest pressure reached was 18 and in another 19 cm. of water; in neither instance was the pressure sustained for any length of time. The cecal appendage of a large variety of animals was found to exhibit no evidence of secretory capacity.

That the fluid collected is a true secretion and not a filtrate is indicated by the height of the pressure approximating the systolic blood pressure, the intraluminal pressure being greater than the tissue pressure in the appendical wall. In the rabbit about 20 cm. of fluid may be collected during the first six hours of obstruction, the rate of secretion tapering off gradually. The obstructed vermiform appendixes of man which exhibit secretory pressure secrete usually from 1 to 3 cc. of fluid a day. The true nature of this fluid demands explanation still as does the morphology of the cell or cells in which it has its origin.

All the varieties of appendicitis recognized by the pathologist may be produced by luminal obstruction in animals whose vermiform appendage possesses the capacity to secrete fluid. Animals whose cecal appendages exert no secretory pressure fail to exhibit histological evidence of tissue damage attending obstruction. Similarly in animals (rabbit) in which secretory pressure is manifest, if the pressure is maintained at a low level by removal of increments of secreted fluid no histologic evidence of injury may be observed. In the obstructed exteriorized vermiform appendix of man the histologic picture of diffuse suppurative appendicitis has been produced, but obstruction has been released before gangrene or perforation occurred.

Whereas there may be other causes of appendicitis than obstruction, the only tangible cause is obstruction and it would appear that this cause alone will suffice to account for all the varieties observed clinically.

Fecaliths and swelling of lymphoid tissue are probably the most frequent causes of appendical obstruction in man. Kinks, bands, position (retrocecal), and stenoses may also cause obstruction. Occasionally, even in excised appendixes exhibiting good evidence for an obstructive origin, no obstructive agent can be demonstrated. The possibility of prior extrusion or solution of an obstructing fecalith in such instances is at least a possibility to be considered. How the appendix fills and how appendixoliths form still remain to be elucidated.

The matter of "geography, diet, and culture" as related to the origins of appendicitis is a myth. Appendicitis is not infrequent in natives of China. Chimpanzees transported from Africa develop the histologic picture of appendicitis under conditions of luminal obstruction. The native Negro of East South Africa develops appendicitis there, and in this country the mortality from appendicitis in the Negro is higher per unit of population than in the whites.

Appendicitis is a problem of the public health. Throughout the years from the age of 5 to 19, the disease ranks as the second to the fifth most frequent cause of death. In the ensuing years, whereas its toll of life remains largely the same for several decades because other more frequent causes of death appear, appendicitis wanes in significance. In the gainfully employed between the ages of 15 and 64 in this country, appendicitis ranks as the eighth most common cause of death.

McBurney said in 1889: "What we wish to accomplish in the treatment of appendicitis is, not to save half

of our cases, nor four cases out of five, but all of them." The years have taught us to be less sanguine, but we must through processes of professional and public education learn how to better our present cheerless accomplishment.

The pathologist must revise his concept of the origins of appendicitis. A revision of the clinician's concept of the symptoms and physical signs of the disease is equally necessary. The indications for the removal of the appendix must be liberalized, for this humble but treacherous worm is truly the "Uriah Heep" of the abdomen.

CONCLUSIONS

These studies on the functional behavior of the vermiform appendix in man and anthropoid apes and upon the vermiform cecal appendix of the rabbit and the cecal appendages of a large variety of animals, justify the conclusion that appendicitis may occur through the agency of luminal obstruction in all appendixes which exhibit a secretory capacity. It is believed that obstruction is the probable sole exciting cause of spontaneous appendicitis in man.

Appendicitis destroys enough lives in this country to warrant stamping it a problem of the public health. Every effort should be bent to enlist the cooperation of the public, departments of public health, physicians, and surgeons in stopping this avoidable wanton sacrifice of lives.

It is hoped that a better understanding of the functional behavior of the vermiform appendix will help to clarify the chaotic status of our knowledge with reference to the origins of appendicitis and bring patients with appendical colic earlier to operation.

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Report of American Student Health Association Committee on the Hygiene of Physical Education Activities*

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I. Orientation.

A. The hygiene of physical education activities is largely the practice of individual hygiene by means of such activities. Physical education activities that lead to the formation and practice of habits that produce, improve, maintain, and defend the somatic, mental, and social health of the individual participant are practices of individual hygiene. They are also practices of group hygiene, provided usually by the home group, the school group, and the neighborhood group. They have become increasingly practices of societal hygiene (community hygiene) particularly in this country under the influence of such organizations as the Playground and Recreation Association of America, now known as the National Recreation Association.

B. Physical education activities are first and, in part always, autonomic. They become volutaristic with the beginning of the post-natal life of the individual. Muscle tone is developed early in prenatal life and this state of basal autonomic activity is maintained to a greater or lesser degree by the voluntary muscles of the individual as long as he lives. More obvious prenatal autonomic motor activities may be noted in the kicking, thrusting, turning, and other exercises of the voluntary muscles of the unborn child. Autonomic motor activities may be noted also by listening to the heart beats of the fetus.

C. Volaristic physical education activities are necessarily postnatal activities. They are motor and locomotor exercises of the skeletal muscles and of all the organ systems associated with those muscles and upon which the skeletal muscles depend for the maintenance of life and for the performance and perfection of functions essential to their health. These volutaristic exercises of body, mind, and personality educate the postnatal individual physically, mentally, and socially, during his infancy, childhood, youth, and even his maturity. Such education may be wholesome and desirable or vicious and undesirable.

D. There is an essential *holism* of physical education activities. They *must* be activities of the *whole* individual. Mrs. Walter H. Brown, known affectionately to all Public Health people in the United States and most everywhere else as "Mother Brown," urged years ago in connection with child health programs that education is concerned with "the *whole child*." We are learning much about the whole child in educational circles today. That insistence applies without any reservation to the physical education of the individual in every age period. These activities *must* be—they cannot escape being—physiological, psychological, and social activities. They are motor and locomotor behaviors of the human postnatal individual who as a multicellular biological organism is and at all times must be a somatic, psychological, and socially integrated being. The integrations may be poor, or fair, or good, but all are essential to the wholeness of the life and therefore the health of the individual.

E. Thus physical activities are autonomic and volutaristic exercises of actual and potential soma, mind, and personality that educate the individual physically, mentally, and socially. And may I repeat, this education may be wholesome or vicious. It may contribute to health or it may damage or defeat the health possibilities present in the biological heritage of the individual.

F. Prepared leadership in physical education activities is of the utmost importance in relation to the formation and practice of favorable somatic, mental, and social health habits by the participant. Infancy, childhood, youth, and maturity need this prepared leadership. The mother and father, the play leader, the teacher, the physical education teacher, the physical

director, the athletic director, the coach, the physician, and every other dominant leader of participants in physical education activities, whether those activities be the squirming, kicking and thrustings of the infant; the play of little children; the games of children; the sports and athletics of youth; or the physical recreations of maturity should be prepared with a competent knowledge of the fundamentals of human biology and its essential involvements of anatomy, physiology, psychology, and social psychology.

G. And those leaders in physical education activities are the most effective in their influence upon the formation and practice of favorable health habits who combine an adequate preparation in human biology with a personality that stimulates loyalty, respect, and confidence in those whom they are leading.

H. Competent professional individual health service is an essential to the favorable hygiene of physical education activities. The common occurrence of vulnerabilities that are health hazards to the individual participant forces the acceptance of the conclusion that competent health examination, advice and treatment are an essential part of the hygiene of physical education activities. In support of this contention you need only remind yourself that childhood and youth belong to the period of greatest incidence of tuberculosis; that these are age periods in which rheumatic heart disease appears; and that there are a number of other health conditions of the individual that along with these indicate a modification of physical education activities fitting those activities to the needs of the individual. Competent health examination, advice and treatment can be secured only from the adequately prepared physician.

I. Medical education and medical experience will ultimately furnish in large number scientifically competent men and women who will not only be able to uncover somatic vulnerabilities such as those noted above but will also be able with increasing keenness to discover the mental health hazards and personality health hazards of the individual that call for his special protective and educational guidance in order that the physical education activities of the individual having such limitations may be so modified that they shall contribute to the improvement and defense of his mental and social health.

J. Insistence must also be made on the inclusion of a competent service for the prevention and care of traumatic injuries as an essential part of the hygiene of physical education activities. Investigations that have been made in recent years furnish ample evidence of the importance of these agents that injure health in terms of athletic injuries in our secondary schools and in our colleges and universities.¹

K. Furthermore, the hygiene of physical education activities involves—it must involve—the hygiene of physical, biological, and societal environment of those activities. Physical education activities cannot be favorable to health in an environment that is physically or biologically or societally adverse to the somatic health or the mental health or the social health of the individual participant.

L. Informational Hygiene is an inescapable part of physical education activities. Every leader of physical education activities, whether that leader be a parent, a teacher, the head of a neighborhood group, a physical director, a coach, or some other leader, is inevitably expected by each individual member of his group to furnish information for the solution of his somatic, mental, and social health problems. No leader of physical education activities in any age period is fit for his or her leadership in the absence of a fundamental preparation for the job. Too often such a leader is a source of misinformation and sometimes of vicious information.

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†Chairman. Drs. Chenoweth, Howe, Kler and York.

II. *The Somatic Hygiene of Physical Education Activities.*

The practices of physical education activities. The formation and practice of health habits through participation in physical education activities, that produce, improve, maintain, and defend somatic health.

A. Let us remember first, that physical education activities are exercises of the somatic functions of the individual. They are autonomic and voluntaristic and passive, mild, or vigorous exercises of (1) the voluntary muscles, (2) the brain, spinal cord, peripheral nervous system, and the autonomic nervous system;² (3) the endocrine glands and other glands; (4) the heart and blood vessels; (5) the organs of respiration; (6) the heat regulatory organs; (7) the excretory organs; (8) the organs concerned with the supply of fuel foods, other foods, food accessories, water, inorganic salts and oxygen, all of which are, and every one of which is, essential to physical education activities and all of which are, and every one of which is, necessary for the maintenance of the life and therefore of the health of the individual.

B. Let us remember further that favorable physical education activities stimulate metabolism—they *must* stimulate metabolism. They must stimulate nutrition, growth³ and development within the limits of the biological heritage of the individual.

C. We should also remember the effects of deficiency or deprivation of physical exercise. You need only to recall the children you have known who have suffered the effects of infantile paralysis. Or perhaps you yourself have had a fractured arm or leg and have spent several weeks under the immobilizing influence of a splint. Do you remember what happened to the unused muscles in infantile paralysis or in consequence of immobilization? This point need not be labored.

D. The facts which have been placed before you justify the expectation that you will agree that the somatic hygiene of physical education activities involves not only a consideration of the exercise of skeletal muscles but also of a number of other somatic involvements, such as respiration, nutrition, water supply, vitamin and inorganic salt requirements, excretion, and rest.

III. *The Mental Hygiene of Physical Education Activities.*

The formation and practice of habits favorable to the mental health of the participant in physical education activities. The activities of physical education that produce, improve, maintain, and defend the mental health of the individual.

A. Biological research has proved that all protoplasmic cells of whatever sort possess certain fundamental properties in common. Every human life begins as a single protoplasmic cell, a living fertilized ovum about one one-hundredth of an inch in diameter, formed by the union of two living germ cells. In common with all protoplasmic cells, the single-celled human being possesses sensitivity. Every cell of the multicellular human organism produced by successive mitoses of that first cell is sensitive to stimuli from its internal and its external environments. Every such cell responds to the stimuli that disturb its sensitivity with some sort of resultant organic activity. This *reflex action* is a common property of *all* protoplasmic cells.

B. Biology teaches also that stimulations repeated in sequence at intervals of sufficiently short duration produce reflex cell responses that vary in quantity and quality. The variations produced by such repetitions must be due to continuations of the influence of preceding stimulations. This persistence of the effects of the stimulations of cell sensitivity is of the nature of memory. We have here evidence of protoplasmic memory, or cell memory, described by biologists as organic memory.⁴ These phenomena exhibited by associations of cells such as those formed by the cells of the nervous system and those of the

organs of the voluntary muscle systems, constitute associative memory.

C. Physical education activities exercise the protoplasmic cells of the voluntary muscles and those of the neurone chains that are associated with them as well as of the numerous other associations of cells implicated in physical education activities. These activities lead to the establishment of organic memories and associative memories that govern such skills and techniques of physical education activities as those of the child that has "learned" to use its eyes, its tongue, its arms and legs, its fingers, and that has learned to walk and to run. They are probably fundamental to the skills and techniques of the specialized participant in physical education activities, of whom the athlete is perhaps the most spectacular example.

D. Cell sensitivity, cell reflexes, cell memory, and associative cell memory, are probably fundamentals of mind. In any event they are essential parts of all physical education activities.

E. Mind is interpreted in this report as government of behavior. In accord with this interpretation, there are several levels of mind. These levels are actually or potentially present in the living organization of the single protoplasmic cell that, for an hour perhaps, is all there is of a human being at the beginning of his or her life. These levels of government—that is to say, of mind—may be described as (1) physical-chemical, (2) tropic, (3) hormone, (4) nerve reflex, (5) instinct government, and (6) government by intelligent mind. Physical education activities exercise *all these levels of mind*. They exercise all of them automatically and some of the voluntaristically. There is reason to believe that they exercise an educative influence on all these levels of government. There can be no question that under favorable leadership physical education activities exercise, and therefore educate, the qualities of intelligent insight mind, reflective mind and creative mind. These are exercises that when favorable produce, improve, maintain, and defend the mental health of the participant.

F. Thus physical education activities, particularly in the periods of childhood and youth, may lead the individual to form and practice habits of mental hygiene that are characterized by such qualities as self-control, self-respect, satisfaction without regret, joyousness, happiness, and wholesome enthusiasm.

IV. *The Social Hygiene⁵ of Physical Education Activities.*

The formation and practice of social health habits by the individual through participation in physical education activities. The education of—the production, improvement, maintenance, and defense of—wholesome social personality through favorable participation in societal physical education activities.

A. The life of each one of us begins with a somatic heritage, a mental heritage, and a heritage of multiple personalities present actually and potentially in the single cell that for a time—an hour perhaps—is all there is of any one of us. Under the influence of favorable environment and of favorable behaviors in relation to environment we grow, develop, mature and become multicellular somatic, mental, and social individuals, educated for good or for evil by the sorts of interactions that characterize our behaviors in relation to our physical, biological, and societal environments. As we understand it, as a product of these behaviors, personality is the somatic, mental, and social evidence with which one describes and identifies himself to others.

B. Physical education activities are exercises of multiple personalities. Under favorable leadership and guidance selective habits are formed by the individual that build for him wholesome social personality, that is characterized by fair play, sportsmanlike behavior, unselfishness, respect for the golden rule, good taste, cooperation, altruism, and similar qualities of healthful social personality.

C. Under the wrong sort of leadership vicious personalities are emphasized and educated by participation in physical education activities, made unfavorable by such leadership. The re-

¹See, for example, Bulletin No. 23, the Carnegie Foundation for the Advancement of Teaching, "American College Athletics," Ch. VII, "The Hygiene of Athletic Training," p. 135.

²The assumption is that the autonomic nervous system includes the sympathetic nervous system. Perhaps the sympathetic nervous system should have been listed separately.

³For a convincing illustration of influence on growth, see "How Animals Develop," by C. H. Waddington, W. W. Norton and Company, 1936, p. 112, fig. 28, "Differences in guts of tadpoles fed (a) mainly on vegetables, (b) exclusively on meat (from Durken)."

⁴See "Heredity and Environment in the Development of Men," by Edwin Grant Conklin, Princeton University Press, 1930. Pp. 36 et seq. "Germline Bases of Mind."

⁵The term "social hygiene" as used here does not refer specially to nor is it limited to sex social hygiene, the venereal diseases, prostitution, etc.

sultant personality product may be a-social or anti-social. Selfishness, greed, cruelty, hatred, are synonymous with "dirty play," unnecessary roughness, dishonorable or dishonest conduct.

D. There can be no intelligent argument against the contention that favorable physical education activities under prepared competent leadership, particularly during the period of childhood and youth, exercise selectively and therefore educate selectively emergent wholesome social qualities of personality.

V. "The Law of Exercise."

And now may we call your attention to the evidence we have set before you that supports a conception that was current some forty years and more ago. This conception was that there is a biological law of use, a law of exercise. This law is to the effect that favorable biological exercise stimulates an increase in the blood supply and therefore the nutrition of the organs and organ systems involved; promotes their growth, development and maturation within the limits of their biological heritage; perfects their functional competence; and, again within the limits of biological heritage, educates the body, mind, and personality of the human participant.

In further support of the validity of this "law", we need only remind you of what you already know through your own personal observation concerning the effect of deficiencies or deprivations of exercise and concerning the effects of the wrong sorts, qualities and quantities of educative exercise whether such exercise be mainly physiological or mainly psychological or mainly social.

VI. Summary.

In conclusion, we urge in review of our report, first that every human being is a biological entity constituted by a heritage of an inseparability of body, mind and personality, utterly dependent upon the favor of environment and upon favorable somatic, psychological and social behaviors in relation to environment; second that physical education activities exercise—*must exercise*—the whole individual, physiologically, psychologically and socially; and third that, under favorable prepared leadership, the individual participant in physical education activities, particularly in the periods of childhood and youth, will form and practice health habits that produce, improve, maintain and defend the somatic, mental, and social qualities of his life.

Report of American Student Health Association Committee on Informational Hygiene*

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If the achievement of your Committee on Informational Hygiene seems meager for the time which has elapsed since the last meeting of our association, this very modest beginning may be attributed in part to some early uncertainty concerning the committee's membership. By the time the personnel of the committee had been definitely agreed upon and the objectives of the committee defined, May had come, and the approaching end of the college year made it impossible to accomplish anything before the opening of the colleges in September.

Since your committee seeks further guidance and constructive suggestions concerning the specific services it may render, it may add to the pertinence—even the relevancy—of the suggestions received, if we state the general objectives which the committee have in mind.

In his letter concerning the work of this committee, Dr. Shepard expresses the belief that owing to the Second Conference on College Hygiene, the members of this association have shown a marked increase of interest in the area of informational hygiene. He expresses the hope that this interest may be maintained and that the many problems of college hygiene be systematically studied. I quote from his letter:

"It is our hope that this group (the Committee on Informational Hygiene) can set up a constructive plan of attack on these problems in the nature of a long-time plan. You may wish to work on this plan over a period of several years, as we are doing in our tuberculosis committee, giving the association a progress report each year and using the annual meeting as a means of discussing this progress and authorizing procedures to be carried out during the succeeding year."

Among the problems suggested for this long-time planning program were the following:

1. A detailed outline of subject matter, material, methods and activities for informational hygiene courses appropriate for use in teaching:
 - a. General college students.
 - b. Junior college students.
 - c. Seminary students.
 - d. Teachers' college students.

- e. Students in education who are planning to teach hygiene at the elementary and secondary school levels.

2. The construction of a selected reference manual in the field of informational hygiene with a list of references which are scientifically sound. These might be arranged by subject. Some plan should be devised for adding new references to this list from year to year and for making these manuals available to our members. Your committee might serve in a consulting capacity to advise those who seek information. This manual should include particularly all visual aids which are available for hygiene teaching.

In developing his theme Dr. Shepard stresses the hope that this committee will be able to render significant service to the teachers of hygiene in the smaller colleges, many of which are not members of our association. He suggests that when the committee gets under way it may be found expedient to have committee representatives in each of our sectional organizations.

In the light of this statement of your committee's objectives, some may have misgivings as to whether or not we have "what it takes," but certainly no one can assert that our President is lacking in vision. If this committee is ever accused of over-ambition we can "point with pride" to the source of our inspiration.

In accordance with the suggestions outlined above, the Committee on Informational Hygiene was divided into three sub-committees and, since it did not seem advisable to attempt a consideration of our whole program at the outset, each of these sub-groups was asked to study, and to report on a single subdivision of the foregoing recommendations. In order to save the time that would have been consumed in getting a consensus of the committee's opinions as to what should be our immediate objectives, the chairman took the liberty of assigning the problems on which the three sub-committees were asked to submit suggestions for our initial report.

One group consisting of Dr. DeKruif, Dr. Scott and Dr. Turner, with Dr. Turner serving as chairman, was asked to give some preliminary consideration to the question of *materials*

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†Chairman.

for hygiene instruction and to submit recommendations concerning the kinds of service our committee might be able to provide in that area.

Dr. Wood and Dr. Forsythe, with Dr. Wood as chairman, were asked to give their attention to the *problem of methods of teaching hygiene* and to recommend procedures for fact-finding and for conveying to those wishing it the kind of help they are seeking.

Dr. Gould, acting alone, was asked to study the question of visual aids and to suggest procedures for discovering or providing such aids and for making them, and information concerning them, available to the members of our association and to others who are interested.

All the members of our committee expressed a keen interest in the subjects they were asked to consider and seemed eager to attack their respective problems. As I have already stated, the time available was not sufficient for fact-finding concerning the present status of content and methods in informational hygiene; nor was it possible to prepare recommendations in detail concerning the organization best adapted to the kinds of service the committee hopes to render. However, it is hoped that the brief, tentative and rather general recommendations that follow will be sufficient to provoke discussion leading to the authorization by this Association of specific undertakings for the coming year.

Reporting for the sub-committee on Materials of Hygiene, Dr. Turner writes:

"It is proposed that the Committee on Informational Hygiene should produce an annotated bibliography covering reference books useful to teachers of college hygiene. The first step in securing such a bibliography would be to query teachers of hygiene as to the books which they would recommend as most helpful. It is felt that in phrasing the letter, the Committee might well request teachers to indicate the particular values which they have found in various books. It is proposed that on the basis of these comments and further references to the specific books, the Committee should prepare its annotations for the list. We recommend that this be prepared for distribution at the time of the meeting in December, 1939.

"We recommend there be included with this bibliography a statement of the types and sponsorship of newspaper columns.

"We recommend that there be included with this bibliography a list of professional magazines together with a statement touching their perspectives and specific values. We recommend also the inclusion of a commentary with regard to the nature and uses of health materials in current publications outside the standard professional magazines.

"We recommend that the Committee on Informational Hygiene consider among its future activities the possibility of preparing suggestions with respect to the teaching of specific units of instruction. These suggestions would be brought together from the Committee and from our membership and would include possible student activities, classroom demonstrations, visual materials, and references to source materials. Units to be given consideration might include such diverse activities as community surveys by students on the one hand and units of direct classroom instruction on the other."

Dr. Wood in reporting for the sub-committee on methods includes some brief comments on a variety of methods which she has studied or observed, and upon one which she has tried. I take it that she does not wish these comments to be interpreted as recommendations but rather as suggestions thrown out to provoke discussion. Some of these suggestions and comments are thought provoking.

From a letter following these comments couched in more general terms I quote the recommendations of Dr. Wood's committee:

"It would seem to be the judgment of our committee that a study of the most effective methods of teaching hygiene should be made in order that the teaching of hygiene may eventually be placed upon a comparative scientific basis of teaching as is reading, mathematics, etc. Such advance can be made by the teachers of hygiene who become research-minded in their point

of view toward evaluation of improved methods and techniques in teaching hygiene.

"It would seem then, that the function of this committee is (1) to find out what is being done and follow lines of special investigation now being made and, (2) to foster or stimulate a further study along this line in schools where such studies are not being made.

"Closer coöperation with the departments of education in the various colleges and universities may show techniques or methods now being applied in other fields which if applied to the teaching of hygiene might help to place the teaching of this subject on a more scientific basis. It is possible that new and unexpected contributions may result from new departures in method. Progress regarding such studies should be possible to be followed by a continuation report, something on the order of the reports sent in to the North Central Association of Colleges, which give opportunity for the college to show evidence of its growth and development. Hygiene departments should be encouraged by this committee to experiment with new methods and evaluate their results toward making advance in this science of teaching hygiene.

"A study of how student interest may be utilized will depend upon knowledge of the various methods which are being found most effective.

"It would seem as yet impossible to say to what extent it is desirable to be guided by student interest until it has been determined how comprehensive student interest really is. This must await further studies.

"The time has been too brief this fall to prepare adequate questionnaires which would secure data from the colleges concerning present methods of teaching. This is being planned for the coming year. The data concerning present methods which are found especially effective could be reviewed and mimeographed if expense would permit, or reviewed and published in the *JOURNAL-LANCET*, if space would permit."

Dr. Gould, reporting for his committee of one on Visual Aids, Visual Teaching Aids, included the following:

1. The presentation of graphs, lecture outlines, charts and statistical data in chalk upon the blackboards.
2. The presentation of hygiene material in the form of charts or posters in colors.
3. The use of lantern slides to present data, graphs, charts or illustrations.
4. The use of silent or sound movie films pertaining to subjects within the field of hygiene.
5. The use of scientific demonstrations, including preparations mounted under the microscope, gross bacteriological and pathological specimens, papier mache and plaster models particularly of anatomical parts, and experiments (with equipment from the physiology laboratory) which are not too technical yet serve to sell important points.

It is recommended by the undersigned that this sub-committee stress the necessity of securing, from our national organizations pertaining to the prevention of disease and the improvement of health, a greater number and better quality of sound movie films pertaining to hygiene subjects, even if financial subsidization becomes necessary. We need more films of the quality of *Behind the Shadows*, provided by the National Tuberculosis Association.

SUMMARY AND CONCLUSIONS

I have stated rather fully the general objectives of our committee, namely, to study the materials (including visual aids) and the methods of hygiene instruction at the college level and to collect, formulate and recommend such materials, devices, activities and procedures as may be helpful to the members of our association and to others desiring guidance toward improvement of the quality of hygiene instruction in their respective institutions. This general statement should provide a basis for discussion leading to the adoption of recommendations for the future guidance of your committee. It should also help to guide the discussion and to promote relevancy.

The reports of our three sub-committees have been given almost in full, but not as final recommendations. The content

of these reports should be regarded rather as tentative reflections advanced to stimulate discussion along lines that will be suggestive of the future activities of your committee.

**Report of Round Table and
Supplementary Committee Report**

Since there was insufficient time at the general session on Friday afternoon, December 30th, for a report on the Round Table conducted by the Committee on Informational Hygiene, it was suggested that this report be included in the Proceedings. Pursuant to this suggestion your committee submits the following:

It seemed to be the opinion of those attending the Round Table, and it is the judgment of your committee that our task for the current year should be the continued pursuit of the objectives outlined in the Committee's report. In outline, then, the program of our three sub-committees will be as follows:

I. *The Sub-Committee on Materials* will collect and prepare material for a booklet or pamphlet containing:

- A. An Annotated Bibliography.
- B. Abstracts of pertinent articles and papers, both lay and professional.
- C. Suggestions concerning the special values of books and articles.
- D. A listing of materials for certain units of instruction demanding special emphasis, e. g., Cancer, Venereal Disease, Tuberculosis.
- E. Visual Teaching Aids.

As a means of making these materials available to the membership of our association, it was decided to include the literature and the visual aids in a single publication, and your Committee was authorized by the Association to seek the cooperation of the Metropolitan Life Insurance Association in preparing and publishing the booklet.

Pending the publication of this material your committee wishes to call the attention of the members of our association to the following present sources of bibliographic material:

- 1. Special bibliography prepared by the National Tuberculosis Association and the *Library Index*, issued weekly by the National Health Council, 50 West 50th St., New York City.
- 2. American Public Health Association bibliographic booklet.
- 3. Bauer and Hull (book) *Health Education of the Public*, W. B. Saunders, 1937.
- 4. Bibliography of the Massachusetts State Board of Health.

II. *The Sub-Committee on Methods* proposes:

- A. A general fact-finding inquiry concerning methods of teaching college hygiene now employed in the member institutions of our Association.
- B. A more specific and more personal inquiry addressed to those institutions or individuals who seem to be doing original or interesting things in this area.

On the basis of this effort at fact-finding and selection, together with whatever constructive proposals can be formulated, it is hoped that some variety of helpful suggestions as to methods may be submitted at our 1939 meeting.

Submitted by the Committee on Informational Hygiene:

- A. G. GOULD, M.D.
- C. E. TURNER, M.D.
- WARREN FORSYTHE, M.D.
- FRANCES SCOTT, M.D.
- MARY DEKRUIF, M.D.
- AMELIA WOOD, M.D.
- Prof. T. BRUCE KIRKPATRICK, *Chairman*.

Book Reviews

Surgery of the Ear, by SAMUEL J. KOPETZKY and Sixteen Contributors; 468 pages, 4 color plates and 292 illustrations; New York City: Thos. Nelson & Sons. Price, \$12.00.

Surgery of the Ear, published in loose-leaf form, edited by S. J. KOPETZKY, consists of a series of articles by various authors. There is some repetition, due to several writers covering the same ground. For example, "Surgical Anatomy of the Temporal Bone" is discussed in a separate article by O. V. Batson, while H. J. Williams, in his article on the "Surgery of Acute Suppurative Tympanomastoiditis," again reviews the surgical anatomy.

The contribution of H. I. Lillie on the "Surgery of Otitic Sepsis" is excellent, as is that of G. Holmgren on "Surgical Therapy in Otosclerosis." This latter will perhaps be one of the first articles to be supplemented with loose-leaf additions, as it is still very much in the experimental stage. The article on "Surgery of Suppurative Meningitis" by James Dwyer is interesting in that more space is devoted to the use of sulfanilamide than to surgery.

The subjects of facial nerve surgery, plastic surgery, and surgery of suppurative petrositis are satisfactorily covered. W. E. Dandy has contributed an article, in his authoritative style, on the "Surgery of Ménière's Disease." E. Sachs' article on "Surgery of the Acoustic Nerve" is also well worth while.

For the practicing otologist, as well as the advanced student in otology, this book offers a good review of the recent advances in surgery of the ear. It promises to keep up with the future progress by means of the loose-leaf feature.

"A Symposium on Cancer," University of Wisconsin Press.

The Institute of Cancer conducted by the medical school of the University of Wisconsin, in 1938, published a *Symposium on Cancer* which is very enlightening on the subject of cancer. The institute was addressed by Levi Kreyberg, of Oslo, Norway; Clarence C. Little; Madge T. Macklin; Edgar Allen; Howard B. Andervont; James Ewing; Henri Coutard, Paris; Warren Lewis; Stanley P. Reimann; James B. Murphy; and Emil Novak.

The first named gave a most interesting method of studying the tar cancers produced in mice. His findings are especially interesting in regard to the heredity of cancer. Little discussed at length the various factors to consider in the etiology of tumors. His experimental work is also concerned with the production of cancer in mice with irritants. Dr. Madge Macklin of Ontario discussed the familial incidence of cancer. She cites many cases among human beings to show that it does have a hereditary tendency.

Allen discussed the relation of ovarian hormones and the development of atypical growths and malignant tumors. He believes that injections of oestrogens have tended to render the individual more susceptible to malignant growths. Andervont discussed carcinogenic substances other than tar in the production of tumors in laboratory animals. Macklin again discussed the pros and cons of irritation as a cause of cancer. Ewing discussed the importance of early diagnosis and treatment and the necessity of public education in the control of cancer. He also brought out vividly the methods and indications of biopsy in the diagnosis of tumor.

Novak discussed cervical cancer, especially, from the point of view of early diagnosis and most reliable treatment. Henri Coutard called attention to the fact that there are radio sensitive and radio resistant tumors of the breast. His discussion of cancer of the breast as to the proper application of surgery or radium and X-ray is very interesting and well founded.

The Symposium as a whole is very enlightening. It gives an up-to-date discussion on cancer from every angle by some of our best recognized authorities.

The JOURNAL LANCET

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MINNEAPOLIS, MINN., NOVEMBER, 1939

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL

The JOURNAL-LANCET is pleased to devote this issue to the Fiftieth Anniversary of the University of Minnesota Medical School, not only because the recording of the history of such an institution is of great value but also because this special event was of national significance. A large number of speakers from various parts of the nation, each one expert in some particular phase of medicine, was invited to participate in the program. All accepted the invitation, which testifies to the importance of this occasion. For two and one-half days papers and clinics were presented, which included the last minute information on various subjects. The committee in charge manifested much wisdom in arranging for continuity throughout the program rather than presenting a haphazard group of papers. The general theme was "Some Trends in Medical Progress, with Particular Reference to Chemistry in Medicine." Certainly, there is no more important phase of medicine than that pertain-

ing to chemistry. Abstracts containing the important facts in these papers provide the readers of the JOURNAL-LANCET with advance information. The complete papers are being assembled and will later be published in book form by the University of Minnesota. This volume should be in great demand by physicians and scientists everywhere because of the high quality of the papers and the vast store of information they contain.

The Medical School of the University of Minnesota has passed through an interesting period of evolution. At times there were discouragements and progress seemed slow; at other times the development was rapid. Generally speaking, the foundation was well laid by persons who devoted much time and effort to the institution and made many personal sacrifices. The contributions of all such persons, whether they be governors of the state, members of the board of regents, presidents of the university, deans, professors, and other members of the full-time or part-time teaching faculty, or whether they be mechanics, engineers, janitors, etc., are fully

recognized by the administration, which also realizes that without them the school could never have reached its present state of development. Those who have been on the campus twenty-five years or more have seen much progress, not only in numerous additions to the physical plant, but also in the enlargement and improvement of the faculty and other divisions of the personnel. These persons agree unanimously that at the present moment, under the Deanship of Dr. Harold S. Diehl, the school occupies the highest position in its entire history.

J. A. M.

THE FEAR OF DEATH

Nicodemus went to Christ in the night in search of everlasting life. Ponce de Leon roamed the New World, seeking the fountain of perpetual youth. Steinach severed the *vas deferens* in an effort to rejuvenate old men and stimulated interest in gland transplants and gland fathers. Life has always been held in precious esteem, but when we want to live a long time, do we not have in mind its perfections and forget to count its disappointments?

Owen Meredith gave us in poetic verse "The Apple of Life." The theme was that whoever ate the apple would be assured of never dying but of living forever. The author described how several persons in different stations of life reacted to this proposal. The apple was first offered to King Solomon. After careful consideration of the consequences, he rejected it but passed it on as a favor to his fair Shulamite. She reached the same decision herself and gave it to her prince. The prince, after due deliberation, did not want it and tendered it to his Egyptian sweetheart, who in turn carried it to King Solomon. Thus, the wisest of all men renounced it twice. Each person, after debating the advantages and disadvantages of the mysterious charm, voted against the responsibility of changing Nature's course.

William Cullen Bryant in "Thanatopsis" and Robert Louis Stevenson in "Requiem" show a beautiful resignation toward death. As physicians, we see men who die with a smile—they are said to be brave. We see those, who, after lingering illnesses, welcome the end, while many are wrapped in the kindly mantle of insensibility that deprives them of feeling and fear.

Fear of death is a motivating factor in the calling of the doctor who sometimes prolongs life, sometimes dis-

pels fear, but always comforts the patient and relieves the pain that may be incidental to the ravaging processes of dissolution. He does all this knowing full well that no one can live forever. Let us be reconciled to believe that it should be as it is. After all, it is not so much a question of how long we live but how well.

A. E. H.

NARCOTIC RACKET

All of us have been approached by narcotic addicts who ask for drugs. It is easy to say "no" to these persons. However, a great many times it is difficult for a physician to determine whether one is dealing with an addict or a very ill person who needs a narcotic for the relief of pain.

Narcotic addicts tell varied stories. One that has been worked successfully in several places in eastern South Dakota during the past month, I think is worth recounting in order that physicians may be on the lookout for it.

This particular man is tall and slender, dressed moderately well and purports to be an employee of an electrical service company out of Omaha. He is apparently in considerable pain and tells that he had been under a doctor's care in Omaha for gallbladder attacks some months previous for which this doctor gave him some little tablets under his tongue. He apparently knows about nitro-glycerine for treatment, stating that the physician had given him that first but it did not do him much good. In order to afford relief, he states that the doctor gave him other little tablets which dried up his mouth. After that he took caroid and bile tablets and had not had any more trouble until this time.

He has a room in a private home in the community where he is and states that his boss will be in the next day and the company allows three dollars a day for sickness. The next day he comes back saying he is a little better but still has considerable pain, and needs more drugs. If only a small amount of morphine is given, he comes back the same day with the box all wet saying that the land lady had knocked the box into the slop jar, and destroyed them. About the next day he usually has gone off without paying his rent. Occasionally he will go to a phone in the city somewhere and call the physician saying that he is the foreman for the electrical company, and guarantee payment.

C. E. S.

Book Reviews--Continued

The 1938 Year Book of General Medicine. Infectious Diseases edited by GEORGE F. DICK, M.D.; diseases of the chest by J. BURNS AMBERSON, JR., M.D.; diseases of the blood-forming organs by GEORGE R. MINOT, M.D., and W. B. CASTLE, M.D.; diseases of the large blood vessels by WILLIAM D. STROUD, M.D.; diseases of the digestive system and metabolism by GEORGE B. EUSTERMAN, M.D. Chicago: The Year Book Publishers. Price, \$3.00.

Once again the story of medical progress during the year 1938 is reviewed by the *Year Book of General Medicine*. The outstanding feature of this volume is the inclusion of 151 dis-

ease conditions encountered most often in the office of the physician and at the bedside of the patient. The objective of this *Year Book of General Medicine* is to offer to every general practitioner and to every specialist in various fields the most advanced procedures that occurred in medicine during the year 1938. The editors have filtered thousands of articles from hundreds of journals and their personal selection of the articles included in this volume should be evaluated against their wide clinical experience. The 1938 *Year Book of General Medicine* performs two important services: It is a general medical review for the busy practitioner, and enables him to cover a wide variety of subjects that otherwise would be impossible for him to read; secondly, this volume, with those that have preceded it, is a permanent file of medical contributions.

Societies

SCIENTIFIC PROGRAM OF THE MINNEAPOLIS CLINICAL CLUB

Meeting of February 9, 1939

DISCUSSION OF THE CLINICAL FEATURES OF PULMONARY INFARCTION

T. A. PEPPARD, M.D.

MINNEAPOLIS, MINNESOTA

For the purpose of discussing the subject of Pulmonary Embolism I have selected a small group of patients' records and prepared a chart summarizing the salient features of each. I shall try to point out and emphasize some points of interest and importance in the clinical course of this condition.

The postoperative pulmonary complications are most commonly: (a) infectious (as bronchopneumonia), (b) massive collapse or atelectasis, (c) embolism. Embolism may be of the massive type resulting in sudden death, usually within a very few minutes. While no one of us has a lot of these cases in his private practice, those we do have are all too harrowing. They occur, as a rule, from 10 to 14 days following traumatism, or after operation or delivery, rarely after the 21st day, occasionally from the fifth to the seventh day. They thus differ in the time of their occurrence from bronchopneumonia or atelectasis, which usually appear on the first or second postoperative day. More often than not the embolic occlusion occurs suddenly, without warning, though on occasion one or more minor episodes representing blockage of smaller vessels may precede the major event. As a matter of fact there undoubtedly are many instances of embolism in smaller vessels which pass unnoticed or at least undiagnosed. A sufficiently large non-fatal embolus induces a state of shock, with greatly lowered blood pressure, rapid, weak, thready pulse, shallow and usually rapid and painful breathing. There is pallor, profuse perspiration, some degree of restlessness, and almost invariably great apprehension on the part of the patient. Cough is not particularly prominent. Sputum is not abundant, and inasmuch as hemoptysis is always emphasized, it should be noted that bloody sputum may or may not occur, may be very small in amount, and is more apt to appear 24 to 48 hours after the accident. Instead of sharp pain, there is more often a marked sense of oppression over the chest. The condition of the patient is such that it precludes any exhaustive physical examination. Few physical findings may be elicited for the first 12-24-36 hours, after which there may be heard a pleural friction rub, and signs of increased density in the lung.

In addition to occurrence of pulmonary embolism as a postoperative complication, following trauma, after delivery, I want to emphasize in particular the frequency of its appearance in cases of heart disease, and cardiac decompensation.

In Dr. McCartney's 1927 paper, he reviewed 73 autopsied cases of pulmonary embolism, of the department of pathology of the University of Minnesota, between the years of 1910-1927. Fifteen of these were post-traumatic, an additional 8 post-traumatic with subsequent operation, 31 postoperative, 3 postpartum, and 16 medical. Of the medical cases 6 were hypertension, with cardiac failure, and in 4 of the 6 the source of the embolus was from the right auricle; 1 additional from the right auricle and vena cava, and 1 from the common iliac. In 1935 Dr. McCartney reviewed the cases from 1927-1933. Here he paid attention particularly to injuries. Of 9781 necropsies, 1499 or 15 per cent were deaths from injuries. There were 61 cases of pulmonary embolism; traumatic emboli represented 20 per cent of the total pulmonary emboli; and 80 per cent of the post-traumatic emboli came from injuries of the lower extremities. While, as might be expected, many more men than women were involved in accidents, embolism following trauma is decidedly more common among women. He suggested that the higher incidence of varicose veins in the female might be

responsible. Among those persons dead of post-traumatic embolism the incidence of anatomical heart disease is significantly higher than it is in persons dead of trauma without embolism.

Ware & Bullock reported 207 instances of pulmonary emboli among 7632 autopsies at the Los Angeles General Hospital. Eighty-one per cent of the total number of deaths from this condition occurred in patients over 40 years of age. There were more embolic deaths among medical cases than among postoperative or traumatic cases. Heart disease and decompensation were the most frequent causes. Besides the picture of shock with cyanosis and a sense of substernal pressure, the author, as others have done, emphasizes the evidence of right heart failure, and the occurrence at times of a to-and-fro rub over the base of the heart.

Eliason and McLaughlin report 120 pulmonary complications and 39 deaths out of a total of 7326 cases. Respiratory tract infections at the time of operation increase the possibility of pulmonary complications. Of the 120 cases, 45 were bronchopneumonia, 23 atelectasis, 19 lobar pneumonia, and 9 embolism.

Craft reports 49 cases of fatal pulmonary embolism from 1928 to 1938 at the University of Minnesota Hospitals. The average age of these patients was 55 years. Sex incidence showed 61 per cent males and 38 per cent females. Fifty-one per cent occurred in the medical group, 42 per cent in the surgical, and 6 per cent in the gynecological group. Both lungs were involved in 51 per cent of the cases, and when only one lung was involved it was most commonly the right. Cardiac disease was present in 67 per cent of the cases. According to the theory of Aschoff there are four main factors in the production of thrombosis: (1) changes in the blood flow, (2) changes in the blood plasma, (3) changes in the blood elements (increased or decreased power of agglutination), (4) changes in the walls of the vessels.

Rigler, Jensen and Nessa reviewed cases of pulmonary infarcts over a two year period, 1936-1938, at the University of Minnesota Hospitals. There were 17 cases, 9 males and 8 females; the median age was 51. Dyspnea was the most prominent symptom in 11, pain in 5, and hemoptysis in 1. Fifteen of the cases were on the basis of cardiac failure. They point out, as have others, that the roentgen appearance of the lesion may vary considerably, in fact may not present a demonstrable shadow at all, and agreed that pulmonary infarction is not necessarily excluded because of lack of demonstrable X-ray findings.

Averbeck reports six autopsied cases, all of which were misdiagnosed coronary thrombosis. In discussing these cases, the author emphasized the fact that there is no radiation of pain; that the liver may be observed to enlarge rather rapidly, and the heart rapidly dilate to the right.

Barnes, White and McGinn have called attention to a characteristic electrocardiographic tracing obtained in cases of pulmonary embolism, and point out distinguishing features from the tracings in coronary artery thrombosis.

The chart summarizes the essential findings in a selected group of 13 cases, 6 males and 7 females. The ages varied from 18 to 75 years.

The first case is that of a robust young woman of 31 who had a laparotomy for the removal of a uterine fibroid. The operation was not attended by any unusual difficulties, and for ten days her convalescence was exceptionally uneventful. On the evening of the tenth day, she had a sudden seizure and died within five or ten minutes.

The second case is that of a 66 year old woman, who entered the hospital for a general examination. A couple of months before she had had a mild infection, which had been called influenza. On June 26th, while sitting in a chair, she had a sudden collapse, with marked respiratory distress, moderate cyanosis, and moderate drop in blood pressure. Following this she ran a low grade fever for perhaps ten days. A pleural friction rub was heard at the base of the left lung, she spit up small amounts of blood 24 hours after the attack. On July 11th there was an entirely similar episode, followed by the development of physical signs in the base of the right lung.

I was entirely at a loss to account for the source of the emboli. On July 29th she for the first time showed definite evidence of thrombophlebitis in the left femoral vein. This patient lived and has remained well since.

The third is that of an 18 year old boy who at autopsy was found to have a bacterial endocarditis, the pulmonary valve only being involved, this vegetative lesion being the source of multiple pulmonary infarcts.

The fourth, a 40 year old woman, had cardiac decompensation. We were never sure as to the reason for her cardiac failure. At autopsy, the heart weighed 400 grams, valves were normal, there were mural thrombi in both right and left ventricles with infarcts of the kidney, spleen and lung.

The fifth, a 70 year old man, was admitted to the hospital May 13, 1938, because of congestive heart failure. Two days later there was an episode consisting of great dyspnea, cyanosis, rapid pulse, drop in blood pressure, expectoration of blood, mixed with pus. The patient's condition was critical. I was in doubt at first as to the reason for the sudden onset of these symptoms. The following day pneumococcus type three was identified in the sputum and the X-ray showed multiple areas of density scattered through both lungs. After the use of type III antipneumococcal rabbit serum the temperature rather promptly returned to normal. There was uneventful recovery and the X-ray showed clearing of the pneumonia densities. November 12, 1938, following an upper respiratory tract infection, there was a sudden onset of right sided chest pain, weakness, and fever; there was shortness of breath, moderate cyanosis and expectoration of blood. These two attacks were rather strikingly similar, however the X-ray appearance of the lung was quite suggestive of infarction and after 18 hours the temperature, which had risen to 101.5, returned to normal. There was no further bloody sputum and the patient remained well, and was discharged from the hospital after a few days.

The sixth was a 54 year old woman, who had a hysterectomy performed November 9, 1938. On November 19th, there was sudden onset of chest pain, dyspnea, cyanosis, shock, blood pressure 80/60. There was no expectoration of blood. A few days later pain developed in the other side of the chest. Physical findings as well as X-ray showed areas of increased density. She had a moderate fever and leucocytosis. Four or five weeks later, after a very stormy time, there was development of bilateral lung abscess. The patient became well enough to be discharged from the hospital the latter part of January 1939, and has continued to improve.

The seventh—(this case is unique)—a previously well, robust, athletic woman, 30 years of age, underwent a cesarean section February 7th. February 16th there was a sudden attack with rapid shallow respiration, cyanosis, pallor, shock, with drop in blood pressure, sense of pressure beneath the sternum, great apprehension. She subsequently expectorated a small amount of blood. February 24th there was a similar occurrence (though much milder), in the opposite lung. There followed a very stormy interval, during which time she had a septic temperature, and leucocytosis as high as 53,000. The hemoglobin which had been normal dropped to 50 per cent, and there appeared, first in the left chest, and subsequently in the right, signs of pleural fluid, which on aspiration was clear, amber colored, and sterile on continued incubation in ordinary broth. Guinea pigs were inoculated and developed tuberculosis. After the fluid receded the X-ray showed characteristic densities in both lower lobes. The patient was kept at rest, and has now remained well for four years.

The eighth—a young man with old healed rheumatic valve defects of the mitral and aortic valves, with severe congestive failure. There was sudden death. Autopsy showed pulmonary embolism.

Case 9—a male aged 76 who had previously had slightly elevated blood pressures had an electrocardiographic tracing within normal limits in January. Occurrence of coronary occlu-

sion on May 6th. On May 11th he had an attack of extreme dyspnea, cyanosis, anterior chest pain not referred—the duration was short and inhalation of oxygen gave relief. After one day roentgenologist reported a small amount of infiltration at the base of the right lung. On May 15th the sputum contained some blood streaks. May 17th there were physical and roentgenological signs of consolidation in both the right and left lower lobes of the lungs. By May 29th the patient's general condition was greatly improved in every respect. The afternoon of that day without warning he had a sudden seizure, gasped for breath, became cyanotic, pulseless, quickly became unconscious and died within a few minutes. Though autopsy could not be obtained I am convinced that the final episode consisted of a massive embolism of the pulmonary artery the source of which was a mural thrombus in the right ventricle.

The remaining cases are somewhat similar to the others. Case 10 is a 54 year old male, a railroad man, who suffered an intertrochanteric fracture of the right femur October 28th. His progress was uneventful until he had an acute "cold" on January 22nd, followed in a few days with signs of pneumonia and a pleural friction rub. On February 2nd there was sudden collapse, death ensuing two days later. Autopsy. Case 11, a 56 year old female, had an extensive operation for leukoplakia vulva. Attack followed April 4th from which she recovered. Case 12 was a 54 year old male with hypertension, myocardial degeneration and congestive heart failure. Death. Autopsy. Case 13—a 75 year old female who had hypertension and myocardial degeneration. January 1st she suffered a hemiplegia and on the 15th developed signs of increased density in the thorax. She lived three weeks and then expired. Autopsy.

Of the 13 cases, there are 7 cases of heart disease, 4 of these being hypertension with coronary sclerosis and myocardial degeneration, 1 unexplained, 1 with old healed rheumatic valve defect, and 1 with bacterial endocarditis. Five of the 13 recovered, and have remained well. Six came to autopsy.

In summary I desire to emphasize:

1. The frequency of occurrence of pulmonary embolism in medical practice principally as a complication of heart disease. Pulmonary embolism may be the terminal episode and cause of death in (1) congestive heart failure and in (2) cardiac infarction. Pulmonary embolism may be a complication of, or be complicated by pneumonia. Pulmonary abscess may be a sequel to pulmonary embolism and infarction. Cardiac disease contributes to the likelihood of the occurrence of pulmonary embolism as a postoperative complication.

2. The clinical state of shock which quite regularly accompanies pulmonary embolism.

3. The fact that blocking of small vessels may occur more often than is realized.

4. The source of the embolus need not be at once apparent.

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Meeting of April 13, 1939
E. S. Platou, M.D., Presiding

THE METRAZOL CONVULSIVE THERAPY OF THE PSYCHOSES

JOSEPH C. MICHAEL, M.D.
MINNEAPOLIS, MINNESOTA

The original work with metrazol convulsive therapy was reported by Von Meduna in July, 1935. He expressed the theory that convulsions bring on a change in the metabolism which is capable of altering the course of schizophrenia. It had been known that essential epilepsy implies an inhibition of oxidation and a disturbance in protein metabolism resulting in an accumulation of nitrogenous end-products, which are removed by the seizure. Investigations through animal experimentation have shown that metrazol constricts the blood vessels of the vital centers and thus precipitates the epileptiform convulsion. With the seizure there comes a hyperacidity which in turn brings on a dilatation of the blood vessels to normality. Early animal experiments failed to reveal brain damage.

During the last two years the literature has become quite laden with reports on the principles, technic, precautions, complications, etc., of this method. I wish now to dwell mainly upon clinical observations and therapeutic results. The subjects of this brief report were confined either in the local private psychiatric hospital or in the division for psychopathic patients in the Minneapolis General Hospital during the last one and one-half years. Insulin shock therapy was employed exclusively during the preceding year.

TABLE I

	Schizophrenia — Total Group				Relapse
	Satisfactory Improve-ment	Good Improve-ment	Little Improve-ment	No Improve-ment	
Public Hosp. Cases	2	4	0	6	1
Private Cases	8	2	4	0	4
Total	10	6	4	6	5
Per Cent ...	38.5	23	15.4	23	

TABLE II

	Manic-Depressive — Total Group				Relapse
	Satisfactory Improve-ment*	Good Improve-ment	Little Improve-ment	No Improve-ment	
5 Cases	4	0	0	1	3

* immediate.

SELECTION OF PATIENTS

In our series are included twenty-six schizophrenics, five manic depressives, one paranoid state and one psychoneurotic. Definite or suspicious impairment of the cardiovascular, pulmonary or osseous systems, recent head trauma and other organic nervous system disorders, metabolic irregularities revealed by blood and urine examinations, the presence of fever whatever its cause, or long bed confinement and inanition, were considered adequate reasons for rejection. To indicate how many patients in a psychiatric hospital under current routine circumstances are selected for shock therapy, it should be stated that the subjects thus treated usually ranged no higher than 10 to 15 per cent of the entire group hospitalized because of mind disorder at one time. Marked constitutional types, or cases with chronic impairment of many years duration, were as a rule not accepted for this method of therapy.

Seven of the above schizophrenic patients were subjected to a variable number of hypoglycemic shocks without success, after which the convulsions were induced. Four of these patients ultimately recovered.

COMPLICATIONS

In the literature these are dealt with as (1) mechanical, viz.: fractures and dislocations and (2) inflammatory, embracing the reactivation of latent tuberculosis, myocardial reactions, pulmonary or other abscesses. Their incidence has been calculated to have occurred in 2.2 per cent of total patients treated. The mortalities reported until recently are computed by Von Meduna and Friedman to indicate a rate of 0.29 per cent.

During the treatment of these thirty-three patients dislocation of the jaw occurred twice in one subject and once in another. The convulsive periods in one man, a 47 year old farmer, were characterized by a more prolonged apnea than was

observed in other patients. The case was one of catatonic stupor. Fair recovery followed the thirteenth shock.

COMMENT

A list of 1465 cases of schizophrenia collected from the American literature by Von Meduna and Friedman reveals that all types combined show a remission rate of approximately 20 per cent and "good improvement" in an additional 38 per cent. The remission rate in 210 "acute cases" on the other hand was 60 per cent. When we note this recovery rate in cases of recent onset we should bear in mind that without shock therapy it is possible to gain good remissions in at least 20 per cent of this particular group of patients.

The tables show that the convulsive therapy in a small series of manic types of manic depressive psychoses are not noteworthy. One patient, a woman age 37, made a phenomenal recovery; one young woman, 19, failed to show more than temporary recession; the other two were favorably influenced to a point where manic symptoms subsided for two or three weeks. In one, relapse occurred twice, in another three times. We thus know that the manic phase is less likely to be favorably influenced than the depressed. However, better results tend to be obtained in cases of the noncircular types of depressions. Here again it should be recalled that a relatively large proportion of the affective group are ultimately recoverable without the aid of shock therapy.

For the convulsive therapy in cases of paranoia one can make claims in only very modest terms.

More encouragement is derived from the one case of so-called agitated neurasthenia. The tendency to relapse in the affective group was demonstrated in this instance. However, recovery followed one relapse.

As to relapses in the schizophrenia treated cases, in three of these, subsequent convulsive treatment was followed by recovery and in two other cases no benefit was obtained from further follow-up treatment.

It is still too early to determine the extent of damage to the central nervous system and other systems which may take place in subjects who present no apparent complications after a course of successful treatment.

This therapy has been undertaken in each case after considerable forethought and rather exhaustive investigations. The technical treatment details are of less concern than the many factors having to do with selection of suitable patients, continuation of treatment, as well as general and special psychiatric management. We are getting some favorable results hitherto impossible, yet our experience thus far tends to temper the overenthusiastic claims indicated in some of the earlier reports.

Discussion

Dr. R. BIETER: I think the theory that the metrazol works by causing an irritation or producing a metabolic change is as good as any. I wonder if any of the vitamins in extremely large doses have been used, either alone or with metrazol. Maybe the B group with or without vitamin C. Theoretically they may be of value and I am wondering if they have been used.

Dr. J. C. MICHAEL: We haven't used that in connection with metrazol therapy.

Dr. R. BIETER: If you were to try it I would say use rather large doses intravenously.

Dr. J. C. MICHAEL: How about intraspinaly?

Dr. R. BIETER: I don't know.

Dr. LEO G. RIGLER: Are you using this at all in the constitutional psychoses of the functional type?

Dr. J. C. MICHAEL: There is a limited border-line group of patients with psychoneuroses or minor psychoses, who are refractory to all kinds of treatment and it seems that with this therapy we can do something we have not been able to do before. I have not had much opportunity to try it except that one outstanding case in which we got a splendid result and I know from my experience, the way we used to handle those cases years ago, we had them in hospitals for months and months and did not seem to get any place and here we give them a few injections of metrazol and get a significant change in personality.

I have one case in a private hospital, a woman from a neighboring state, who had with her depression, an anorexia; she

began to lose weight until she was down to 70 lbs. We fed her forcefully including vitamins and minerals in the diet and thus got her weight up to 90 lbs. Just recently I have given her four metrazol injections and now she is improving very nicely. Today I was able to write a letter to her husband that she is now really showing a promise to get well. It is just remarkable.

I know we have obtained recoveries in schizophrenia in the first attacks, perhaps in 20 per cent of the attacks, without shock treatment; I don't know, nobody knows what the true spontaneous recovery rate is in schizophrenia. It depends on how you group your cases and how you diagnose your cases. We are not very desirous of treating the hopeless patients.

You can say this definitely, during the early stages of schizophrenia we can do a lot in a great percentage of cases. I think the figure of 60 per cent satisfactory recoveries with but few remissions is not greatly exaggerated.

Dr. J. C. DAVIS: Have you any ideas as to what height the blood pressure may rise?

Dr. J. C. MICHAEL: Yes, experimental work has shown that in two minutes following the injection the systolic blood pressure will rise 40 mm., in five minutes the systolic pressure tends to return to normal and at sixty minutes it drops approximately 35 to 40 mm., the lowest reading. The diastolic pressure reading as well as the pulse and respiratory rates show similar fluctuations.

Dr. NATHANIEL LUFKIN: A number of investigators have described gross and microscopic changes in the brain resulting from hypoglycemia in humans and in animals. These works were recently reviewed and summarized by Dr. A. B. Baker, of the department of neurology at the University of Minnesota. Dr. Baker also presented his own studies on clinical cases and described the results of his experiments with animals. In this work he demonstrated that a number of different types of pathologic lesions may result.

Perhaps the least serious of the lesions is chromatolysis and loss of Nissl substance in the ganglion cells of the brain. Such alterations may be found with fair regularity in animals killed during and immediately after hypoglycemic shock. They represent an acute, probably transient change. Another change which has been described in both acute and chronic hypoglycemia is the presence of petechial hemorrhages. In most instances these hemorrhages are few, very small, and scattered, and result in no permanent functional impairment. Occasionally they are numerous and confluent. In such cases there is little question that more or less functional impairment must result. Severe gliosis of the brain, diffuse or localized, may also occur. In certain brains this reaction has been so severe that the microscopic appearances strongly resembled those of glial tumors. Large and small areas of cystic degeneration are very spectacular, but rare. Yet such lesions are capable of producing profound functional alterations.

I recall one case of dementia praecox which developed a marked and apparently permanent mental impairment following hypoglycemic shock. It is probable that the brain of this patient suffered from one of the more severe types of injury just mentioned.

I have no knowledge of any publications dealing with pathologic changes in the brain resulting from the administration of metrazol, but Dr. Baker tells me that there is substantial evidence that metrazol may cause exactly the same changes that have been attributed to hypoglycemia.

From the pathological standpoint, therefore, it would seem that the use of convulsants is not without danger, and that these drugs should be administered only by experts with the greatest of care.

Dr. J. C. MICHAEL: When we find such changes in the diabetics who have spontaneous hypoglycemia we need not be surprised, we should anticipate them.

I will say this, I am not alarmed at all by the possibility of such findings in the brain, I sort of expect that. With our metrazol cases we have not had a death so we have not had an opportunity to do any necropsy studies. Nor have we had a death in our insulin therapy. We have just been lucky. I do recall that the very first patient, a woman in her thirties, treated at the General Hospital, had a protracted coma; she developed hemiplegia. She had been a private patient of mine several

years previously and had made a recovery from two previous attacks of psychosis without shock therapy. We had to send her on to the State Hospital this time and that looked like a bad experience. I had quite a time to inject new enthusiasm among my junior associates in the hospital to continue this treatment. The end of that particular story is this,—about seven months after she was sent to the State Hospital she returned back home and is well at this time, as far as I know.

There is another point, one of our distinguished neurologists in the East has been actually operating on brains and doing partial excision of frontal lobes on patients who have persisting obsessive trends, and has reported seemingly good results. We should not be so alarmed about what the pathologists can find in some of these brains and what the clinician naturally expects may occur, not if we bear in mind what we have to deal with. We are dealing with something that looks hopeless, the kin are feeling panicky and ask that we do something. Once in a while in chronic cases we get a surprisingly favorable result, once in twenty perhaps. *This type of treatment is emphatically not free from probable serious complications.*

Dr. J. C. DAVIS: I have a patient now who developed symptoms of coronary thrombosis three hours after a metrazol convulsion. Recent work reported in the literature indicates that some cases of coronary thrombosis are preceded by hemorrhage in the wall of the coronary artery produced by rupture of a capillary. Perhaps there is a very high rise in blood pressure during the convulsion which might rupture a capillary in the wall of a coronary artery.

CHEMOTHERAPY OF PNEUMONIA

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Observations of the bacteriostatic effects of sulfanilamide in vitro experiments by Colebrook and Kenny,² Long and Bliss,⁸ Lockwood,⁷ and others, have suggested several possible actions of the drug upon certain bacteria, prominently the hemolytic streptococcus. Attempts to cure experimental infections in mice with sulfanilamide and its derivatives have been made by many workers. Evidence has been presented suggesting the effect as a neutralization of toxins, interference with the metabolism of the bacteria, and aid to phagocytosis. None of these beliefs has been confirmed. Results have been particularly favorable with the hemolytic streptococcus and meningococcus, but survival rates are variable and difficult to correlate because of differences in methods used. Early experimental observations in pneumococcus infections were less favorable, although Cooper, Gross and Mellon³ reported benefit when working with type III infections. In most instances, optimum concentration of the drug in the blood seemed to be about 1 to 10,000 or 10 mmg. per cent.

The toxicity of sulfanilamide in mice, dogs and rabbits has been studied and 50 per cent lethal doses vary from 2 Gms. to 6.3 Gm. per Kg. body weight. In dogs doses of 6 Gm. per Kg. weight and upward were found by Custer⁴ and associates to cause nausea, vomiting, diarrhea, acidosis, and ataxia up to twelve hours duration. The evidence of effect upon the central nervous system was thought to be due to edema of the brain and spinal cord found at autopsy. Toxic effects in man are commonly anorexia, nausea, dyspnea, cyanosis, lassitude, headache, dizziness and fever. Other less common manifestations such as jaundice, rash, leukopenia, hemolytic anemia, agranulocytosis and sulph-hemoglobinemia are thought to be due to idiosyncrasy to the drug, and indicate immediate withdrawal. The frequency of acidosis has led to the administration of equal doses of soda bicarbonate routinely. Sulfanilamide appears to be readily absorbed from the gastro-intestinal tract, and oral administration is the method of choice unless impractical because of nausea. Difference in effect may be due to variation in the portion of the drug acetylated in the body, this conjugated form having no therapeutic value. Attempts to determine a scheme of dosage have involved quantitative determination of both the free and conjugated forms in the blood.⁵

Until recently no clinical studies had been reported offering sufficient material for statistical purposes in treatment of pneumonia with sulfanilamide. Reports of single cases or small groups without controls were not impressive. Price and Myers¹¹

have submitted a comparative study of 115 patients treated with sulfanilamide, forty patients who received anti-pneumococcus serum and 94 control cases given only supportive treatment. While these observations cannot be considered conclusive, the series was conducted with a thoroughness that permits a number of interesting considerations. The cases were largely alternated, lack of uniformity in the final figures being due to exclusion of moribund cases from the series and inability to secure serum for all types. Effort was made to type all cases, and where this was delayed, sulfanilamide was alternated with non-specific therapy. One is particularly impressed by the massive dose of the drug employed. Thirty grains were given per twenty pounds body weight during the first twenty-four hours, half of which made up the initial dose and the remainder divided equally every four hours for six doses. Subsequent twenty-four hour doses of fifteen grains per twenty pounds were maintained until the day following the fall of temperature to normal, unless contra-indicated by severe toxic manifestations. No initial dose exceeded 120 grains, and the drug was discontinued after five days when no beneficial effect was apparent. Blood sulfanilamide level of approximately 7 to 15 mgm. per cent was maintained by this dosage in a majority of cases. The mortality rate of the total series was 15.7 per cent for the sulfanilamide group and 30.8 per cent in the control group. For forty patients with pneumonia of types I, II, V, VII and VIII treated with the serum the mortality rate was 27.5 per cent, whereas in 57 patients in these types given sulfanilamide alone the death rate was 10.5 per cent. Average duration of the disease was slightly longer in those receiving sulfanilamide, yet the incidence of bacteriemia was higher in those receiving serum. This suggests the relative greater frequency of demonstrable bacteriemia in those types. Beneficial effects of sulfanilamide was suggested in earlier fall of temperature and pulse, especially in cases of shorter duration, but estimate of symptomatic improvement was difficult because of lassitude associated with the drug. Associated diseases were well distributed. The incidence of chronic alcoholism was surprising, a total of 66 in the series, but daily use of alcohol without regard to quantity was the deciding factor. Cyanosis, mild nausea and vomiting, headache, and lassitude were common, but interfered little in the course of treatment. Acute hemolytic anemia occurred after sulfanilamide in six cases. These responded well to blood transfusion. It is interesting to note that prior to onset of the anemia there occurred an abrupt increase in neutrophils. A gradual moderate secondary anemia developed in a greater number treated by sulfanilamide than among the controls.

Early unfavorable reports of the effect of sulfanilamide upon experimental pneumococcus infections gave rise to a search for a more specific and less toxic derivative. Such a compound, sulfapyridine, was described by Whitby¹² early in 1938 under the name of M. and B. 693. His observation suggested its value not only with the streptococcus and meningococcus but also in pneumococcal infections in mice, especially in types I, VII and VIII. He held the opinion that sulfapyridine was less toxic and more effective in less dosage. Others¹⁰ believe that its toxicity is considerably greater than thought to be by Whitby,¹² having used a soluble sodium salt of the drug. They infer that the observations of Whitby¹² were in reality due to lack of absorption, which appears to vary considerably.

Evans and Gaisford⁵ investigated the value of sulfapyridine in 100 cases of pneumonia, reserving an equal number of alternate cases as controls. Early in the series 3 gms. were given daily for three to four days, followed by 1 Gm. daily for three days. A number of cases exhibited a secondary rise in temperature after return to normal. When in later cases 2 Gms. were administered as an initial dose, followed by 1 Gm. every four hours, this secondary temperature rise was not seen. Furthermore in some patients who received 9 Gms. during the first 24 hours, decline in temperature was more striking. The effect of this behavior was not studied in blood cultures. Decline of temperature and toxicity was gradual in most cases, but followed a rather distinct period of improvement noted within the first 48 hours in 60 per cent of the cases treated, whereas in only 34 per cent of the controls did this obtain. The maximum total dose was 25 Gms. in each case. Cyanosis occurred in about 25 per cent of the cases, methemoglobin in six of these.

The effect upon the white cell count was not constant, even in those cases where dosage was higher. No agranulocytosis was seen. Empyema unaccountably occurred in six patients receiving sulfapyridine, with only one among the controls. Death rate was 8 per cent in the treated cases, 27 per cent in the control group.

Flippin⁶ and associates conducted a series of 100 cases of typed pneumonia, employing doses suggested by Evans and Gaisford. Severe nausea and vomiting were more conspicuous, necessitating cessation of treatment in ten cases. Other patients with mild nausea seemed to tolerate the drug after the first day. Dehydration from vomiting was severe in a number of cases. Leukopenia and hemolytic anemia assumed to be associated with idiosyncrasy obtained in only two cases, but a moderate secondary anemia developed in several others. A drop in temperature and general symptomatic improvement appeared within 48 hours with striking regularity. The blood level of free sulfapyridine was determined in most cases and found to vary from 1 to 18 mgm. per cent in patients receiving the same dose, suggesting as in previous experimental work, variation in the conjugated form in different individuals. An interesting consideration here is the greater frequency of rapid fall of temperature in the group with lower concentration. Moreover, there was uniformity in duration of the illness. Since the series lacks controls, the mortality rate of 4 per cent is not conclusive, but three of these deaths were type III infection, of fourteen such cases treated. It is significant that the clinical response observed was similar to that of Evans and Gaisford.⁵ Others¹ have observed similar effects in pneumonia in children, and found a conformity in the interval between initial treatment and fall in temperature.

The clinical evaluation of a drug in treatment of pneumonia is difficult because of the influence of so many factors upon the course of the disease and mortality rate. Most important of these are the age of the patient, duration and extent of the infection before treatment, associated diseases, and the apparent variation in virulence of the pneumococcus from year to year. Credit may erroneously be given the therapeutic agent where crisis is the deciding factor. Statistical data will be convincing only after long trial. The significance of side effects of sulfanilamide and its derivatives observed so widely must be established before general use is recommended. It has been suggested that the cyanosis associated with the drug may militate against benefit in extensive pneumococcus infection.

Most observers generally agree that the apparent clinical benefits of sulfapyridine in pneumonia encourage its trial, but only under circumstances permitting careful clinical observation and frequent routine laboratory procedures.

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Discussion

This paper was discussed by Dr. R. Bieter whose article on this subject has been published in the *JOURNAL-LANCET*, Vol. LIX, No. 4, (April 1939).



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News Items

The American Student Health Association will hold its annual meeting at the Hotel New Yorker, New York City, on December 28-29, 1939.

Dr. E. M. Porter of Great Falls has been elected vice president of the Montana state board of health. He succeeds the late Dr. L. H. Fligman of Helena.

Dr. W. F. Sihler, Devils Lake, and Dr. Paul H. Burton, Fargo, were recently appointed to the North Dakota state board of medical examiners by Governor Moses. Dr. G. M. Williamson, Grand Forks, was re-appointed.

Dr. Patrick E. Kane, Butte, Montana, has been appointed to the board of medical examiners for a term to end March 2, 1945. He succeeds the late Dr. J. A. Donovan. The appointment was made by Governor Ayers.

A crippled children's clinic for residents of Wadena, Wilkin and Otter Tail counties, Minnesota, was held at Fergus Falls October 28.

Dr. B. A. Dyar, formerly of De Smet, South Dakota, is now in Indianapolis where as medical supervisor for the Farm Security Administration he is supervising the medical program of eight states: Minnesota, Wisconsin, Michigan, Illinois, Indiana, Iowa, Ohio and Missouri.

The seventh in a series of postgraduate lectures for North Dakota physicians was conducted in Grand Forks October 24. Part of a state-wide program, the study was conducted by the North Dakota medical association's committee on maternal and child welfare, and was held under the auspices of the Grand Forks district medical society.

Dr. Gilbert J. Thomas, Minneapolis, was elected to the board of the American College of Surgeons at the meeting held in October.

The secretary of the North Dakota State Board of Medical Examiners, Dr. G. M. Williamson, announces that a directory of all physicians practicing in the state will be issued January 1, 1940, and mailed together with the annual registration card to all who have paid their registration fee for 1940. In order that the name and address may be correct in the directory, physicians are asked to complete the application card which accompanies the notice and return it promptly together with the fee early in December. Notice of annual registration is mailed from his office December 1, 1939.

Dr. Irvine McQuarrie, professor and head of the department of pediatrics at the University of Minnesota, will go to China about January 1 to serve as visiting professor in pediatrics at Peiping Union Medical school. Dr. McQuarrie was granted a leave of absence by the university board of regents and will return to the university next year.

Dr. H. Russell Brown, Watertown, was elected president of the South Dakota Health Officers Association at the annual meeting held October 4, 1939. Dr. Brown, who served as vice president the past year, succeeds Dr. Will E. Donahue of Sioux Falls. Other officers elected include: Dr. R. S. Westaby, Madison, vice president; Dr. J. F. D. Cook, Pierre, secretary-treasurer.

Dr. F. H. Poppe has been elected president of the medical staff of Northwestern hospital, Minneapolis. Other officers are Dr. George R. Dunn, vice president, and Dr. H. S. Trueman, secretary-treasurer.

Dr. E. W. Wahlberg, formerly of Morgan, Minnesota, is now in Sleepy Eye where he purchased the practice of Dr. J. L. Ryan.

Officers of the newly organized Minnesota Medical Foundation are: Dr. E. S. Platou, president; Dr. M. B. Visscher, vice president; Dr. R. L. Wilder, secretary; and Dr. J. C. Litzenberg, treasurer. (For complete story see page 490 of this issue).

Dr. A. F. Jensen of the Healy, Law, Woutat, Moore Clinic, Grand Forks, North Dakota, has successfully passed the examination of the American Board of Ophthalmology and has been granted its certificate. Dr. Jensen took his postgraduate work in ophthalmology at the University of Pennsylvania Graduate School of Medicine and in the Illinois Eye and Ear Infirmary before joining the Clinic at Grand Forks. He formerly practiced at Rugby, North Dakota, for a period of ten years.

Necrology

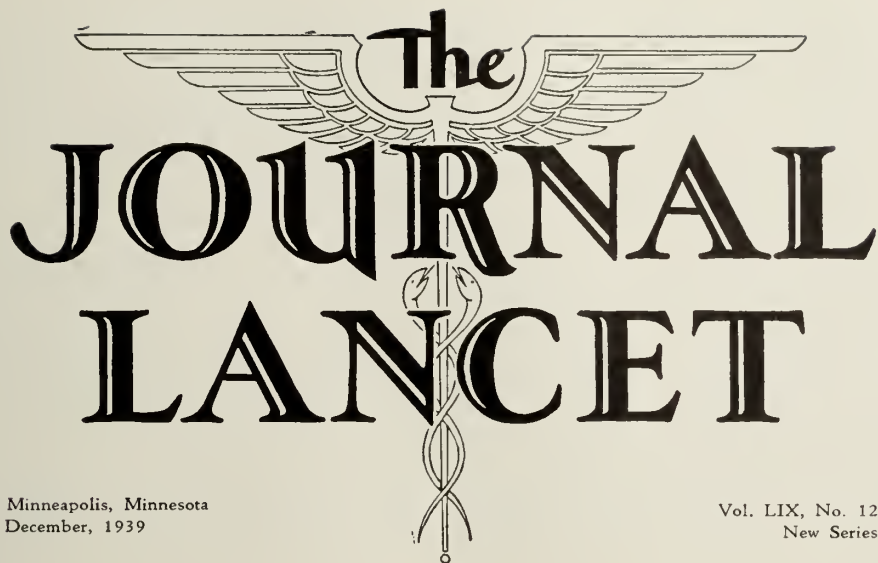
HENRY O'KEEFE

1855-1939

Dr. Henry O'Keefe was born at Lindsay, Ontario, March 14, 1855, and died at St. Paul, Minnesota, September 2, 1939. He was a graduate of the McGill University of Montreal in 1882 and first began practice at Minto, North Dakota, in the same year. He remained there until 1906 at which time he moved to Grand Forks where his practice continued until the time of his death.

He was thus, so far as is known, the oldest practitioner in point of service in the state. He was an honorary member of the Grand Forks district medical society and the North Dakota State Medical Association.

Dr. O'Keefe was an ideal family physician, kind, considerate, skillful; and in addition was friend, confidant, counselor and comforter to his people. His sympathetic touch, inspiring words and assuring smile were potent remedial measures often more effective than the resources of pharmacy. He was public spirited and gave freely of time and means for community interests. He was a valued member of society, kind and helpful to his family, true to his ideals and loyal to his friends, profession, country and Church.



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New Series

The Management of Traumatic Wounds*

Cyril J. Glaspel, M.D., F.A.C.S.

Grafton, North Dakota

ESTABLISHED customs are difficult to change. For many years our medical schools and hospitals have taught that the care of common injuries should be relegated to the most inexperienced student or junior intern and as a result of this faulty teaching the importance of traumatic wounds has been stressed too little. This identical condition prevailed a number of years ago relative to fractures and anesthetics until it was finally recognized that these conditions were important enough to deserve special attention. While this subject may appear very elementary, the statistics of our Compensation Bureaus and Industrial Insurance Companies present a dismal picture of the time lost and the permanent disability resulting from apparently simple wounds. I am certain most of you have had the experience of caring for a wound which at first appeared trivial but later as the infection progressed and the resistance of the patient decreased, additional bacteria were introduced and complication developed which eventually threatened the life of the patient. We have all become more fracture conscious since the World War, and our Chief Surgeon^(a) is still stressing scientific first aid treatment of fractures. The same principles of scientific first aid should apply equally well to simple traumatic wounds and since such injuries are so common and are treated by all general practitioners and surgeons alike, it is especially necessary that the fundamental principles of correct management should be thoroughly understood.

I have nothing new or revolutionary to offer on this subject but only wish to repeat the surgical principles which are generally accepted relative to wound manage-

*Read at the sixteenth annual meeting of the Great Northern Railway Surgeons' Association, Glacier Park, Montana, June 30 and July 1, 1939.

ment and to emphasize the procedures which we have found to be of special practical value. In approaching any subject, medical or otherwise, it is well to have a definite preconceived plan as to how to proceed. Since the management of traumatic wounds is founded on basic surgical principles, it should be considered under the following heads, namely: (1) arrest of hemorrhage and control of shock; (2) careful examination of both the patient and the wound to determine the nature and extent of injury; (3) sterilization and closure of the wound and, (4) placing of the injured tissues at rest plus restoration of function. It does not necessarily follow that the above procedures need be carried out in this exact order, but every major wound should be considered from the viewpoint of these four fundamental principles.

ARREST OF HEMORRHAGE AND CONTROL OF SHOCK

The method of controlling hemorrhage depends entirely upon the size of the involved blood vessels. Arteries and large veins should be clamped with sterile hemostats and ligated with fine catgut or silk. The bleeding from smaller vessels can usually be controlled by firm manual pressure with sterile gauze. If bleeding is profuse and a tourniquet is necessary, a blood pressure cuff is suitable. When inflated to 250 mm. of mercury, injury to nerves and soft tissue is much less frequent when this type of vessel constriction is used and it is to be preferred to other types. It is especially necessary to refrain from introducing additional infection into a wound by attempts to control hemorrhage under unfavorable conditions.

No subject has undergone such extensive experimental and research investigation as the symptom complex known as shock. The most generally accepted theory at present is that shock is a circulatory disturbance characterized by a diminution in the venous return of blood to the heart. There is a reduced volume of blood in the circulation as compared to the capacity of the vascular tree. The two main factors in producing decreased blood volume are hemorrhage and emotional overactivity. Since there is no cardiac weakness present and the heart is well able to propel the blood which is returned to it, there is some question as to whether cardiac stimulants are of any therapeutic value. There are two methods of therapy in treating shock: first, increasing the blood volume by the introduction of fluids in the blood stream, and second, the use of vasoconstrictor drugs in an attempt to reduce the capacity of the vascular system. Blood itself is of the most value but while the patient is being typed and a compatibility test carried out, a solution of gum acacia glucose should be given very slowly per vein.

The injection of vasoconstrictor drugs appears to be correct in theory but according to experiments by Freeman¹ and others, adrenalin is absolutely contra-indicated in extreme shock. It is his opinion that dehydration causes an increased secretion of adrenalin which in turn results in vasoconstriction and a decreased blood volume. The other principles of combating shock are well understood, namely, immobilization of the injured part as soon as possible and certainly before the patient is transported, morphine in such dosage as to control pain (gr. $\frac{1}{4}$ to $\frac{3}{4}$), external heat, the horizontal position, and reassurance to the patient that all is well. The fear complex which is an important factor in the production of shock is difficult to combat. It is especially important not to attempt any form of surgery or anesthesia on a patient who is in shock or has recently recovered from this condition. In my opinion this point can not be stressed too strongly. With the exception of active hemorrhage, all other conditions can readily wait for twelve to eighteen hours until shock has been controlled and the patient is in a more suitable condition for surgery. In a severely wounded patient it is difficult to stand by and do little, especially when anxious friends and relatives are clamoring for action. However, a determined stand to hold off additional procedures which might threaten the patient's life will produce the best final results. The first law of surgery, namely, to do no harm, must be respected in shocked patients above all others.

EXAMINATION OF THE PATIENT AND THE WOUND

The next step in the management of traumatic wounds is a most careful examination of both the patient and the wound in order to determine the nature and extent of injury. The general condition of the patient should be carefully appraised and an attempt should be made to determine whether there is concealed hemorrhage, rupture of the spleen, liver, or a hollow viscus, vertebral or pelvic fractures. Wounds should be studied to determine if foreign bodies are present or if tendons or

nerves have been divided. It is important to remember that patients who are in shock or under the influence of either alcohol or morphine do not localize their pain accurately and it is very easy to overlook internal injuries and fractures. Failure to recognize the presence of serious injury at the original examination is later often embarrassing to the surgeon and may result in a surgical catastrophe.

We recently had a case under observation which illustrates this point. An obese woman of 60 years was brought to the hospital from ten miles away in a Ford coupe following an automobile collision. She was bleeding freely from a leg wound and was in moderate shock. Routine examination revealed a dislocation of the shoulder in addition to the leg wound. The patient was given shock treatment for a period of about two hours. When she was about to be removed to her bed, it was noticed there were blood stains on the sheet under her buttocks. Further investigation demonstrated this blood to be coming from her urethra and an X-ray film of her pelvis revealed multiple fractures of the rami with marked separation at the pubes. The patient had not complained any more on compression of her pelvis on routine examination than on compression of her chest, and this pelvic pathology might have easily been overlooked for some additional time.

STERILIZATION AND CLOSURE OF THE WOUND

In the preparation of the operative field it must be first assumed that no wound is surgically clean. If we recall our bacteriology we remember that most pathogenic bacteria which contaminate wounds, with the exception of the spore formers, are delicate organisms and are not difficult to destroy with most any antiseptic chemical, providing the chemical can contact the bacteria.

This is not easy to bring about, once the bacteria have penetrated the tissues. Bactericidal chemicals kill living cells just as readily as they kill bacteria and their effect on delicate tissue is often destructive. The use of soap and warm water to cleanse a wound is simple yet logical and is rapidly becoming a very popular method with many surgeons. This method was emphasized several years ago by Summer Koch of Chicago in a paper he delivered before this association. It resulted in considerable discussion at that time. It should be applied very gently with sterile gauze so as not to mechanically decrease the resistance of the tissues. The margins of the wounds are held apart by retractors and the deeper portions are gently and thoroughly cleansed with soap and water. Finally the soapy solution is flushed away with sterile water. Since this procedure is painful and since it must be thorough to be effective, it should be carried out under some form of anesthesia unless the general condition of the patient contra-indicates such. If the patient is being hurt, the cleansing procedure is certain to be incomplete and infection will result. Inhalation anesthesia, spinal or nerve blocking, may be employed but there is some question at least in theory as to the advisability of infiltrating novocaine into infected tissue because of the possibility of spreading this infection. In

smaller clean cut wounds we have employed this method without regret, but we do not consider it advisable to use in larger contaminated wounds.

Following the thorough use of soap and water the question arises whether further chemical sterilization of the wound is necessary. Many of the most competent surgeons believe that additional antiseptics are not needed and that the use of some of them are actually harmful to living tissue. It is generally conceded that primary union will result in most cases if the bacteria are not too numerous or too virulent.

With such a multiplicity of highly colored chemical antiseptics which are available today, it creates a temptation which few of us can resist, and most of us feel more secure mentally if one of these preparations is used following soap and water cleansing. Chemical antiseptics which have alcohol as a vehicle are certainly irritating to tissue cells and no one has yet proven that they are any more efficient in a wound or on the skin than an aqueous solution of mercuric chloride or cyanide. This latter solution can be prepared at the cost of a few cents per gallon.

In March 1938 Bernard Fantus,² professor of pharmacology at the University of Illinois, published an article in the *Journal of the American Medical Association* relative to common sense and economy in prescribing drugs, in which this subject of antiseptics was discussed in detail. It is an article that is well worth reading and re-reading.

When the wound has been cleansed and sterilized as completely as possible, the next step is debridement. This is a sound surgical procedure and consists of the excision of all hopelessly injured tissue. However, living tissue should not be needlessly sacrificed. During recent years the type of suture material has attracted more and more attention and there is a distinct tendency among surgeons at this time to use less catgut and catgut of smaller sizes in wounds. It is well known that catgut while readily absorbable is irritating to tissues and produces reactions which retard healing. Recent experimental studies at the Mayo Clinic by Wolfe and Priestley,³ and at Northwestern University by Bates, has demonstrated that the smaller sizes of catgut last as long or longer than the larger sizes; that single strands last as long as double strands; that draining and infected wounds do not cause early absorption of catgut.

The labels which indicate the length of time necessary for catgut to absorb in tissue are not reliable. This is no doubt due to variation in individuals in the absorptive time of gut. Very fine silk or linen and alloy steel wire are less irritating to tissues and are being used more and more frequently as a substitute for catgut. Sizes 35 and 36 in wire are hairlike and are suitable for bleeding points while the larger sizes 32 and 33 are more suitable for fascia. While we personally have had very little experience with the use of wire we do find ourselves using fine silk and linen more frequently each year in place of catgut. Heavy suture material of any kind is to be avoided.

The suture of divided tendons and nerves must be carried out with meticulous care and each of these pro-

cedures is a major operation in itself. Kanavel often said he would rather have the average surgeon operate him for acute appendicitis than for a repair of a divided flexor or tendon. Whenever possible the wound should be completely closed. However, in cases where there is a question as to whether sterilization has been complete or if there has been extensive destruction of tissue, the wound may be partially closed and drainage established at one or both ends of the wound.

Secondary closure in twenty-four to thirty-six hours may be carried out in those cases in which the judgment of the surgeon tells him serious infection is absent. Finally full thickness skin grafts or a pedunculated graft may be utilized in selected cases where it is necessary to immediately replace loss of tissue. The use of rubber sponges as a means of applying pressure to a wound is often of definite advantage. If the wound becomes infected it should be treated with warm moist dressings and it is essential that the dressings be kept warm. Cold very easily lowers the vitality of tissue cells. Moist heat can be best accomplished by the use of heat or infra-red light over moist dressings. However, such dressings should not be continued to the point where the tissues become macerated and edematous. Dry heat can then be substituted. When the infection has become localized it should be drained under general or block anesthesia in as gentle a manner as possible. Blunt dissection, rough retraction, and traumatizing procedures have no place in the treatment of infected wounds. This is one time when gentleness is of paramount importance.

It is again necessary to emphasize the importance of carrying out conservative treatment in infections of the face, upper lip, nose and dental abscesses. Surgical incisions should be delayed unless a well localized abscess has developed. This frequently requires considerable self-control on the part of the surgeon. I think most of us are inclined to be careless in dressing draining wounds. Because they are already infected we are prone to slight our technic, forgetting that it is easy to introduce new organisms and additional contamination. The same aseptic precautions should be carried out in all types of wounds.

The prophylactic use of antitetanic serum should never be omitted and especially in wounds contaminated by animal discharges. Since tetanus has the habit of appearing at the most unexpected times it is best to administer the serum in every wound. Fifteen hundred units can be obtained in a vial for around 70 cents and will afford protection in most cases. The adequate prophylactic dose of polyvalent perfringens antitoxin has not yet been determined. Macey⁴ of the Mayo Clinic has recently reported a case in which 20,000 units was given as a prophylactic dose and yet a virulent gas infection developed in the wound forty-eight hours later. The present recommended prophylactic dose of 1500 units will no doubt protect the majority of injured patients whose wounds have been infected by the Welch bacillus. It should never be omitted in wounds that have been possibly contaminated by manure. Sulfanilamide is still of doubtful value in the treatment of gas infections either as a prophylactic or a curative measure. However,

it should be employed until additional evidence has proven that it has no value. X-ray therapy should be used if available.

PLACING THE WOUND AT REST AND RESTORATION OF FUNCTION

Rest in the treatment of disease and injury is as old as civilization and it should never be omitted in the healing of injured tissues. Splints should surely be employed in other conditions besides fractures. Extensive wounds of the soft parts especially when complicated by nerve or tendon injury should be immobilized in the position of function. As soon as healing has taken place or the infection is under control, gentle active motion should be encouraged always avoiding motion which is painful. It requires considerable surgical judgment to determine when splint protection is no longer necessary for injured and weakened muscles. The use of heat, massage, and other forms of physiotherapy is recognized as valuable after treatment but cannot be expected to accomplish desired results if the earlier treatment has been slighted in any detail.

SUMMARY

The important points in the management of traumatic wounds are as follows:

1. No surgery for any patient who is in shock.
2. Careful examination of all patients and especially in those who are under the influence of alcohol for concealed injuries.
3. Mechanical and chemical sterilization of wounds under anesthesia.
4. Careful closure of the wound with a minimum of suture materials.
5. Use prophylactic antitetanic and gas gangrene serum.
6. Careful detailed attention to restoration of function.

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Repair of Tendons of the Hand*

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IN our experience, tendon injuries have been less frequent during the past few years. The safety engineers of insurance agencies covering industry are seeing that the employees are protected by proper safeguards. In the surgery of trauma there is no subject more important than the proper treatment and post-operative management of injuries to the tendons. Because of limitations of time and space I shall deal only with the acute cases and shall omit the old infected cases which call for prolonged treatment followed by plastic operations.

Prolonged suffering and extensive permanent disability can be avoided only by careful cleansing of the wound combined with proper surgical treatment to prevent infection when the injury is acute. Tendon injuries may be caused by ax wounds, saw wounds, falls on broken bottles or falls through windows. Tendon injuries may also result from the handling of ropes and cables.

The first thought in dealing with these accidents must be strict asepsis. The wounds must be thoroughly opened and the tendon sheaths and the tendons must be carefully exposed. All grease and dirt and other foreign particles as well as devitalized tissue must be removed,

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thus leaving a clean wound. Many surgeons use plain liquid soap to scrub out these wounds. Others use in addition various antiseptics such as iodine, mercurial compounds and various other tinctures which, however, I believe are damaging to tissue and produce embarrassing adhesions. In our clinic I stopped the use of iodine about thirty years ago. In my practice I have used lysol, and at the present time we are using Squibb's liquor cresolis compound because we have found that this was least damaging to the hands of the operator as well as to the patient's tissue.

We never use soap because it is not an antiseptic. There are many variations in the quality of soap. Bacteria can be grown in soap solution. When lysol is used we must consider the alkalinity of the water. We pour the lysol into the water until the mixture feels soapy and slippery, believing that this is a better test than any other method of mixing. Instruments placed in a solution mixed in this manner can be plainly seen. We use this solution both in the hospital and in the outpatient department with all classes of wounds including compound fractures, and we rarely have any evidence of infection.

Tendons of the hand are not only most frequently injured but also are the most seriously damaged. The

use of novocaine as a local anesthetic in the hand is easy and very helpful. It is our custom to soak the injured hand in the lysol solution and then after scrubbing it thoroughly to inject the local anesthesia at a maximum distance from the wound. We endeavor to thus block the nerves, and with this method it is usually easy to find the injured tendons. When all of the tendons on either the flexor or extensor regions of the wrist are divided and damaged it is very difficult to properly identify the ends of the tendons. With local anesthetic it is advisable to extend the wound until one has a good view of the tendons and their sheaths. Always bear in mind that the tendon must be covered by its sheath to get a good result. Also remember that infection may travel up the sheath rapidly. In the acute variety of tendon injuries the repair should be made in the first twelve to fourteen hours. If possible the operation should be performed immediately after injury, and it should never be delayed until the next day because if infection is present it will be fully developed by that time.

When a patient presents himself with a tendon injury after twenty-four hours or more, it is advisable to thoroughly cleanse the wound and surrounding areas and apply a splint to the hand in either the cock-up or flexed positions in order to relax the tendons and permit the closest possible apposition of the severed ends. After waiting for from four to six weeks the wound may be re-opened and one may be agreeably surprised to find one or more of the tendons united and the subsequent repair is thus rendered comparatively simple. It is advisable to first locate the nerve ends and approximate them properly. Now you are ready to suture the tendons. When the patient is under local anesthesia you may ask him to flex or extend the finger. Thus you may see the tendon move in the sheath. You may then grasp the tendon with a Kocher forceps and bring the tendon toward the wound in the sheath and apply a suture to each of the severed ends and then complete the suturing.

Opinions differ as to the suture material to be used. Years ago we used both silk and linen and later we used catgut. I have never used the new stainless steel wire, but I have been observing its use in the hands of others with considerable interest during the last two years. I have discontinued the use of both silk and linen because of the complications which occurred with infection. I have frequently had to open the wound and remove the silk or linen from the tendon in order to obtain healing of the sinuses. During the past few years I have used size 0 chromic catgut with very satisfactory results. In view of the fact that the tendons may at times unite without a suture I have felt that catgut of this size is sufficiently strong to take care of the tension. A great deal of work is being done at the present time showing the irritation of different suture material and the length of time that gut will last in the tissue. I believe that 21 day chromic gut has proved to remain intact from 14 to 20 days, which is ample time for tendon repair to take place. It takes about three weeks for tendons to heal. We place all our tendon injuries in light plaster

casts. These are always left on four weeks as we feel that repair will be complete by that time.

The method of suturing tendons together is end to end. I like to use a needle, straight if possible, that is fastened unto the gut in the factory. I have found small curved skin needles handiest where the tendons were deep. I have never bothered to spiral around or run up high on the tendon and then come down to promote union. I simply go through laterally, never anterior-posteriorly as the knot above tends to adhere to the skin. Suture material on the bony surface especially over the joints does not work smoothly and spoils the pulley effect. Pierce through laterally twice through the end of each tendon, then pull up until the ends come together and tie. This is a very simple knot and it is easy then to pull the tendon sheath down over if it is not too badly injured over the ends of the tendon. All frayed ends of the tendons have been cut off.

In the use of wire I talked with Dr. Sterling Bunell of San Francisco. He has been using it about four years and when you talk with him he speaks of so many hundred tendons being repaired one way and so many another. I have done a great many tendon repairs but not as extensively as he, and I feel that his knowledge of this work is such that I must rely on it.

He brings the tendons together with very fine wire. The wire is on the proximal end and is looped over the tendon and a wire pierced through underneath the two ends, threaded into a needle, piercing up the tendon sheath and coming out through the skin, tied to a piece of guttapercha or rubber tubing so as not to cut into the skin. The distal end is brought down firm until the tendon comes down outside the skin and tied. It may be extended down to the finger nail and tied there so as to be sure that it is pulling the proximal end with sufficient force to stay. At the end of three or four weeks, as he sees fit, he clips the end that is fastened to the finger nail off at the skin. Then with the distal end of wire that he has put in, he pulls gradually to see if he can pull the suture out. If it doesn't come out, he simply puts a strip of adhesive around the arm with a small elastic band to tie the wire to and pull it at a stretch. He leaves it twenty-four hours and as a rule it never fails to pull itself out. He states that by tying the wire and leaving it in the tendon he has found at times the patient gets a pricking sensation very similar to a sliver when he moves his hand. This is very inconvenient and that is why he likes to remove the wire.

Always tie all sutures, if possible, on the sides of the tendon as suture material on top of a tendon has a tendency to cause adherence to the tissue making extension on flexion difficult because of drawing on the skin. After all tendons are sutured and the tendon sheaths approximated as far as possible, draw the superficial connective tissue together over the surface of the tendons getting as much fat as can be obtained. Suture with fine No. 0 or No. 00 catgut, then approximate the skin in any manner you see fit. I use fine sub-dermal suture material as I find it a good deal like wire, it is not prone to infection and can be left three or four weeks without any harm to the tissue.

Rupture and Repair of an Ossified Achilles Tendon*

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OSSIFICATION of the Achilles tendon is indeed an uncommon but definite clinical entity. The writer was surprised to find only two such cases in the literature of this country. One case was reported by Painter and Clark in the *American Journal of Orthopedic Surgery*, May, 1939. The second case was reported by Ghormley in the *Journal of Bone and Joint Surgery*, volume XX, 1938. Ghormley stated that up to 1938 only twenty-one such cases had been reported in the literature and in his article may be found a short abstract of each of these reported cases.

tendon area 8 centimeters above its insertion in the os calcis. The ankle was swollen and edematous and a definite separation of the tendon could be felt, the upper edge of the lower fragment being about 9 centimeters from the insertion of the tendon. The edges were sharp and hard and there was a fairly large hematoma extending to the inner side of the break. Twenty-four hours had elapsed from the time of the accident to his entrance into the hospital and, because of the swelling and hematoma, the leg was elevated and ice packs used for four days on the basis that this delay would decrease the chances of postoperative infection.

Under spinal anesthesia a posterior incision was made from the insertion of the Achilles tendon 18 centimeters upward,



Fig. 1.
Anteroposterior view showing large fragments of ossified tendon.



Fig. 2.
Lateral view of the fractured tendon.



Fig. 3.
Postoperative results.

There are various explanations of the possible etiology of this condition. They range from chronic infection to bone formation by fibroblasts. Many authorities believe that trauma to the tendon is the most common cause. It is quite probable that many cases of ossification of the Achilles tendon go unnoticed unless pain or rupture occur.

CASE REPORT

C. D., a railroad brakeman, 57 years of age, while working July 3, 1937, stepped on a small rock on uneven ground and "felt something snap in the right heel." He did not fall but had severe pain in his heel and could not continue his work.

The family and past history is uneventful except that he had a toxic adenoma of the thyroid removed in 1936 and also that he received a cut by a scythe over the right Achilles tendon when 7 years of age. This injury had caused him no pain or disability during the following fifty years.

Examination twenty-four hours after the accident showed an old scar 3 inches long curving diagonally across the right

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exposing the area of calcification and fracture. It was felt that suturing the bony fragments would give poor union. Therefore, they were removed, leaving a break in continuity extending from the insertion of the tendon in the os calcis to its origin, a distance of about 14 centimeters.

A strip of fascia lata approximately 10 centimeters wide, tapering and extending 20 centimeters in length, was removed from the left thigh. The fascia was drawn over the herniating muscle with chromic catgut. The removed fascia lata was used as a tubular graft connecting the upper end of the tendon with its insertion. Fine black silk was used for suturing the improvised tendon. The tendon was covered with muscle and subcutaneous tissue, as much as possible, and the skin closed with dermal. A posterior right angle plaster splint was applied; the foot was elevated and kept warm.

Passive motion was begun on the seventh day and gradually increased. The patient was ambulatory in thirty days with crutches but the supporting splint was not removed for eight weeks. Owing to the demands made on a brakeman, this man was not allowed to return to his work for five months. He has had no pain or disability since.

On returning to work he continued to perform his duties as brakeman for about fourteen months when glaucoma forced him to retire at the age of 60.

Coronary Thrombosis*

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A VOLUMINOUS literature has developed in the last few years following the careful clinical description of coronary thrombosis by Herrick. These data, probably, are applicable to employees of railroads. However, I am inclined to believe that this group of railroad employees is probably more favored than the general population because they are selected as a rule from the physically fit, a large percentage of them are examined periodically by competent physicians, and generally their employment is permanent. They are nominally secure once they are employed. Finally, many safeguards are placed by the railroads around employees in the way of rules and regulations which tend to minimize many of the hazards of life.

From the standpoint of the employer, however, there is a financial hazard in cases of sudden death or disability due to coronary thrombosis where the question of causation or aggravation of the condition by physical exertion may be claimed. The danger of dismissal from employment or unwished-for change of employment may interfere with the early diagnosis of coronary disease as the patient may not divulge early symptoms which are important.

There will be no time in this short paper to review the literature or discuss all phases of this subject. I will, therefore, mention only a few facts in regard to this condition which, I believe, have the virtue of newness or seem to be of importance. Two very interesting angles of the subject have been brought out rather recently. The first is by Schlesinger¹ who has contributed a new method of studying the coronary circulation by the method of injecting the vessels shortly after autopsy with lead salts in agar agar; by very careful dissection he spreads the whole circulation of the heart out in one plane. He has done this in some fifty-five hearts from patients of all ages and his results show, first, that the normal heart in the great majority of cases does not have anastomoses between the two coronary vessels, and that these anastomoses come about not because of the age of the patient but are due to some obstructing condition in the coronary vessels; and he has shown instances of complete obstruction of one coronary, both sides of the heart being supplied from one coronary. His work is a brilliant advance on the work of Gross and others who have studied the circulation by the opaque preparations and X-ray.

The second interesting work is that of Weiss² and others on the effects of deficiency of vitamin B complex and its effects on the circulation, who have shown that, in alcoholics particularly, there may develop quite ad-economically secure once they are employed. Finally, many safeguards are placed by the railroads around em-

vanced cardiac symptoms such as edema, shortness of breath, moderate enlargement of the heart, and, in some cases, paralysis—relating this condition to beri-beri, and definite changes in the electrocardiogram which may be cleared up by the proper dietary treatment and intensive treatment with vitamin B₁ complex.

More recent studies would lead us to believe that coronary thrombosis is an accident which seems to be occurring at younger ages, particularly in men, or we are recognizing it earlier. It was formerly looked upon as seldom occurring before the age of fifty; now we are seeing more and more cases in the forties and in men who are apparently in good physical condition and leading active lives. We are also learning that, contrary to the older conception, recovery from the first attack is much more likely among the younger groups. Each subsequent attack is more likely to be fatal. Therefore, it is exceedingly important that we do not overlook early thromboses, no matter how mild.

Another point to emphasize is the frequency of premonitory signs of coronary closure. By this, we mean mild precordial pains, pains in the arms, attacks of dyspnea often waking the patient from a sound sleep, coming on a week more or less before the serious attack. Occasionally the wife's testimony about her husband's breathing while asleep may be a helpful clue. These symptoms are often not mentioned to any one until after the accident has happened. This would confirm the views of a number of observers who feel that coronary thrombosis in many cases is not a sudden process but may be taking place gradually over a period of time before the actual closure occurs. The importance of these premonitory signs should be stressed and patients should be educated to get proper advice immediately. Again, the careful examiner may observe respiratory embarrassment in the way of frequency of respirations or deeper respirations in making his examination, even before the patient mentions the fact that he is conscious of shortness of breath. Likewise, blueness of the lips, often due to excessive smoking or pulmonary conditions, such as emphysema, may also be indicative of trouble with the coronary circulation. Arcus senilis, particularly in the forties and fifties, is always significant as an indication of the condition of the arteries. Careful study of the eye-grounds is of the utmost importance, as here one can actually see the arteries and can judge their condition.

Elevations of blood pressure demand careful consideration and frequent careful study of the heart. Not that hypertension is necessarily a cause of disability as regards many occupations, but it is a fact that it may mean earlier arteriosclerosis. All patients with glycosuria should be examined carefully, as increased blood sugar and arteriosclerosis are often found together, and coro-

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nary involvement is more frequent in this group. One must not forget also the dangers of hyper-insulinism in the patient getting treatment for diabetes, both as to its effects on the mental state of the patient and also the danger to the cardiac muscle deprived of enough sugar. Further, in all cases of disturbed circulation of the feet, the condition of the coronary vessels should be a matter of prime consideration, as will be shown in a reported case.

Chronic lues is not often present in the coronary vessels themselves, but may involve the openings of the coronaries due to aortic changes. Rarely, we see sudden death due to stenosis of the aortic valves as a result of arteriosclerotic changes, which may or may not be accompanied by coronary sclerosis.

When it comes to the actual diagnosis of the attack, the type and severity of onset of the pain is probably the most important single factor; or, in those cases without pain, a history of sudden violent dyspnea. As a rule, there is a marked drop in blood pressure after thrombosis. This may not happen until the status anginosus has passed. During the severe spasm the pressure may be increased. With recovery there is a slowly rising blood pressure. These blood pressure changes may vary with the severity of the attack. The pulse may be regular or irregular. We may find simple tachycardia, auricular fibrillation, ventricular extrasystoles, or flutter. One may hear a friction rub in about 15 per cent of the cases; this is heard in anterior infarction, and may be transitory. A leucocytosis appearing from a few hours to two or three days after, and a mild rise of temperature on the following day are of great importance in confirming the diagnosis.

I would like also to mention a recent test which has been studied by Douglas Head.³ He has found that urobilinogen in the urine is markedly positive in true coronary thrombosis and absent in some other conditions which might be confused with thrombosis. He found the test positive in his proven thrombosis cases. This is a simple test and is, I believe, of definite diagnostic value. It was very definite in a case I report later. The test is made by using Ehrlich's reagent, which is para dimethylamine benzaldehyde 0.7 Gm., concentrated HCl (37 per cent) 150 cc., distilled water 100 cc., and saturated sodium acetate. The procedure is as follows:

Into a good-sized test tube, put 15 cc. of urine and add 5 cc. of Ehrlich's reagent. Mix well and add a solution of saturated sodium acetate until the maximum cherry-red color is obtained. Sometimes it will take as much as 20 cc. of the second solution to obtain the maximum color. The positive reaction will vary from a pink color to a bright cherry-red, depending on the amount of urobilinogen in the specimen, and the result is reported 1 plus, 2 plus, 3 plus and 4 plus. If the quantity of urine is less than 15 cc. the test can be done by using the proportions of two-thirds urine and one-third Ehrlich's reagent and adding saturated sodium acetate in amount necessary to obtain the maximum color reaction.

The urine becomes positive in 40 to 72 hours after the onset of the constant substernal pain of occlusion.

If it is not convenient to examine the urine within a couple of hours after voiding, one-fourth teaspoon of household lye will alkalize it sufficiently to preserve the reaction for several days. The addition of the saturated sodium acetate not only enhances the color, but prevents the false positive reactions from indican. The urine should be examined fresh, but not when warm.

One cannot emphasize too much the value of electrocardiography in all phases of diagnosis and treatment, and in prognosis. This is probably the most important method of determining the condition of the heart muscle in routine examinations of men of middle age or older, and is a necessity in those cases where disease of the coronaries is suspected. In the diagnosis of the attack of thrombosis, a previous electrocardiogram is of great value because the changes with the attack will be obvious. In a definite percentage of cases, the attack can be diagnosed by changes in the electrocardiogram; in fact, in probably 75 per cent of the cases one can tell whether it is a posterior or anterior closure. It is of definite value in determining improvement in the condition. Unfortunately, in a certain percentage of cases the electrocardiogram may not show evidences of coronary change even shortly before the development of thrombosis; and, as far as the prognosis, when an attack may take place in a case of damaged coronaries, is of slight help. In cases of multiple closures, the electrocardiogram may be confusing as to exactly what has happened, but it will show evidences of disease. There is no way of determining early whether a patient with coronary disease will die of closure or of congestive heart failure. There is evidence that the hypertensive is more likely to die of congestive heart failure.

Briefly, in regard to the treatment, rest is the most important consideration. To accomplish this, morphin should be given immediately and in large enough doses to completely relieve the pain and quiet the patient. It is just as important, and probably more so, to get a patient with sudden severe pain in the chest into the recumbent position and call an ambulance, as it is in the treatment of any other severe accident. The vasodilators are valueless where the blood pressure is low. In those cases where the pressure is elevated, they may be safely tried. Xanthin compounds are probably of little value as a rule, but may help in those cases where the respiratory movements are impaired. Early in the attack digitalis is not often indicated but may be of value in cases with auricular fibrillation after the first few days, if given guardedly. Quinidine is of value and is indicated in ventricular extrasystoles if they are marked; and some men give quinidine routinely to ward off ventricular fibrillation. Adrenalin should not be given except in cases of cardiac standstill. In that case, it may be injected directly into the ventricle. The patient should be kept absolutely quiet, physically and mentally. The diet should be largely of milk or other liquids that are well borne, given at rather frequent intervals and in small amounts. The bowels should not be disturbed except by very low normal saline or tap water enema at intervals of not oftener than two to three days unless there is distention. The patient should be

kept quiet for at least three months in all cases where there is evidence of infarction, as it takes about that time for scar tissue to develop firmly. In milder attacks it is often difficult to keep the patient at rest long enough. All patients, no matter how mild the case, should not be permitted to sit up until the temperature has been normal for several days, until the leucocyte count is normal, and until there is no urobilinogen in the urine.

The subsequent treatment of all cases is a matter of careful judgment. Patients may live for many years and do active work. However, we know they are liable to subsequent attacks and, hence, they should lead lives that are restricted as far as heavy physical work is concerned; they should have plenty of rest; and they should not be under severe nervous strain. The proper management of these cases requires all the art and science of medicine.

The point of view that an attack of coronary thrombosis is necessarily a cause for total and permanent disability is no longer accepted by many. Each patient must be evaluated individually and probably is better off mentally and physically and lives longer if he can continue in some form of useful activity.

CASE REPORTS

The following cases are of interest and are briefly reported:

Case 1. Mr. G., age 42. Diagnosis: Coronary thrombosis.

Previous to my seeing him, this patient had been having trouble with the vessels of his feet for about two years and was being treated for Burger's disease by pancreatic extract and postural exercises. His first heart attack was on March 15, 1934, and was characterized by violent precordial pain. In the beginning, his temperature was elevated. Pain was relieved by morphin. The following day he showed a rise in temperature and a leucocytosis. He gradually recovered from his first attack. Five weeks later he had a second attack followed by a rise in temperature and a leucocytosis. He gradually recovered and after a period of some months he returned to work. Subsequently he again developed trouble with his feet and I am informed that he has had both of his legs amputated for his vascular trouble. His heart has been acting quite normally in the meantime.

The electrocardiogram is not absolutely typical but shows definite changes which are indicative of thrombosis, particularly in tracings 1 and 3. Tracing 6 suggests changes which are indicative of recovery after thrombosis.

Case 2. Mrs. B., age 72. Diagnosis: Coronary thrombosis.

This patient had a long history of hypertension. She had an attack of cardiac pain and disability some years ago, from which she recovered. She had all the clinical signs of coronary thrombosis in March 1934, followed by myocardial failure, generalized edema, and marked engorgement of the liver. She was in bed for about two years.

This patient's life, I feel sure, was saved by the large doses of morphin, and the worst problem we had to deal with eventually was the stopping of the morphin. Salargyn seemed to be the most important therapeutic agent in her recovery after the morphin, as it apparently cleared up her edema. In addition to this, of course, her fluids were limited and she dieted very carefully. At the end of two years she began to get up and the third year she was able to go out and resume her usual activities. The past winter she spent in Florida. Her heart seemed to be quite well compensated. Her blood pressure

has never returned to its former level. It remains in the neighborhood of 140/90. She is now again in bed at the age of 76, with a mild congestive type of decompensation from which she seems to be gradually recovering again.

The test for urobilinogen was very positive.

The electrocardiograms in this case are entirely typical. The one previous to her attack shows evidence of coronary disease. The second tracing shows very definite signs of thrombosis. The third tracing, on June 5, 1935, shows evidences of a recovery from the thrombosis. These tracings are quite typical and confirmatory of her accident.

Case 3. Mr. H. Diagnosis: Stenosis due to Arteriosclerotic Closure of the Aortic Valves.

This man was 74 years old. He had a history of pain in the chest on exertion for the past ten years. For six years the pain had radiated to his arm and shoulders. The condition was progressive. He was admitted to the hospital on July 19, 1932, with dyspnea, orthopnea, and general edema.

Examination showed fluid in both pleurae, rales in the chest, ascites, and marked edema of the legs. The heart was very much enlarged, rate irregular, and a loud systolic murmur was heard over the heart. The liver and spleen were palpable. His blood pressure was low, 95/60. He was put on digitalis and given salargyn, and he began to feel better. On July 25 his edema had largely disappeared and he was planning to go home. On the morning of July 26, 1932, he was found dead in bed. Postmortem showed some slight fluid in the pericardial sac and some enlargement of the liver. The heart was very large and mostly to the left. The chest measured 25 cm. in width and the heart measured 17 cm. The heart weighed 700 grams. The aortic valve showed a calcified nodular type of involvement with complete stenosis. The root of the aorta was surprisingly free of atherosclerosis. The descending branch of the left coronary showed marked calcification with almost complete occlusion of one of the smaller branches. The heart muscle showed no infarction.

His electrocardiogram shows an inversion of T 1 and T 2, slurring of QRS in 1 and 2, and a deep Q with notching, indicating coronary disease.

SUMMARY

1. Careful examination of individuals over 40 should, as far as possible, include a careful appraisal of the condition of the heart.

2. There are many non-disabling disease conditions which should have more frequent study of the heart, as these patients are predisposed to coronary involvement and deserve special consideration.

3. The technic and diagnostic value of the urobilinogen test has been discussed.

4. The value of electrocardiography has been emphasized both in the early diagnosis of an attack and in subsequent follow-up of the case.

5. Finally, a brief report of two cases of coronary thrombosis and one case of stenosis of the aortic valve due to arteriosclerosis is given.

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A Treatment for Acute Fractures of the Os Calcis*

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IT is generally conceded that fractures of the os calcis have in the past resulted in more disability than any other fracture. Railroads and industry, as well as the unfortunate individual, have been penalized. The healing period has been prolonged, and in most cases a partial permanent disability has resulted which has often been paid for by the employer. It seems strange that such a disabling fracture should have been so sadly neglected. It is only in the past fifteen years that any real attempt has been made to reduce these fractures. More progress has been made in the past ten years than in all previous time.

Roentgenology has probably been the most stimulating influence. Improvement of the X-ray tube and film has made it possible to make an accurate diagnosis following such a fracture, and to determine when the fracture has been reduced. Proper interpretation of the films before and after reduction is absolutely essential. It is necessary that the roentgenologist and surgeon acquaint themselves by carefully studying and comparing films of the uninjured and injured foot in order to know when a proper reduction has been accomplished.

For proper evaluation of a fracture of the os calcis and proper reduction, three radiographs are necessary: (1) the usual lateral view; (2) a view of the tuberosity or plantar dorsal view; (3) an anterior-posterior view which will show the anterior portion of the os calcis and the os calcis cuboid joint. This view is absolutely essential as in many cases the anterior portion of the os calcis is fractured, and must be replaced to avoid thickening under the external malleolus, which always produces disability.

It is not necessary that the fracture be reduced immediately after the injury. In most cases swelling to some degree is present and occasionally the fracture is compounded. Several days should elapse and the patient should remain in bed with the foot elevated and with continuous applications of hot packs to relieve pain and to aid in reducing the swelling. Frequently it becomes necessary, on account of swelling, to wait for a week or ten days, but more than two weeks should not be allowed before attempt at reduction. I have, after vigorous manipulation, reduced three heels three weeks after injury. Two of these resulted in excellent reposition of the fracture, one in only a fair reduction. I have made attempts at reduction in two cases one month after injury, but was unable after repeated attempts to disimpact the fracture. I did, however, overcome some of the broadening with the compression clamp.

Boehler has divided fractures of the os calcis into eight groups. His classification is anatomically excellent. However, from the standpoint of treatment, aside from the simple tuberosity fractures without displacement and

the beak types, I believe this fracture can be placed under two classes: (1) Ordinary fracture with displacement but with no disruption of the subastragalar joint, and with or without fracture into the os calcis cuboid joint. (2) Severe fractures with displacement and crushing of the posterior joint surface and with or without fracture of the anterior portion of the os calcis. The treatment I have been using during the past four years can be applied successfully in both types of fracture. I first presented this method before the Chicago Surgical Society in November, 1936. Publication of this paper appeared in 1937 in the October number of *Surgery*.

No one will deny that an impacted fracture with displacement must be disimpacted before the fragments can be replaced. If this is true in a Colles fracture it is also true in fractures of the os calcis. Impactions in fractures of the os calcis are always firm because of the severe force inflicted when the accident occurs. The amount of force required to disimpact the fracture must necessarily also be great, and the surgeon must acquire courage which will allow him to use sufficient force to break up the impaction. It must be admitted that forceful and only forceful manipulation can bring this about without open operation.

Disimpaction can best be accomplished by placing the anesthetized patient on his affected side on a firm table, preferably a Hawley table. The injured foot is brought to the edge of the table, with the heel extending over the edge. A felt pad is placed between the foot and the table. With the left hand the surgeon firmly grasps the ankle and leg just above the ankle. The right hand grasps the heel and manipulates it laterally with sudden forceful thrusts exerted through the ball of the hand. A tremendous amount of force may be applied without danger of damage so long as a firm grip is maintained with the left hand, and only the heel itself allowed to project over the edge of the table. This thrusting force is repeated until disimpaction can be felt. Occasionally, in very firm impactions, it may be necessary to apply the compression clamp to start disimpaction and the heel can then be fully disimpacted by further manipulation.

Disimpaction having been accomplished, we can proceed in reducing the fragments to their normal or nearly normal positions. If there is a depression of the posterior joint surface, as in the severe types, this depression must be raised into position to restore the carrying angle, or salient angle as described by Boehler. Any loss of this angle, even when no depression of the posterior joint surface occurs, must be corrected to normal or nearly normal. Both of these conditions can be corrected by the same procedure, as follows:

The patient, still on his affected side, is pulled up on the Hawley table with the hip and knee flexed and the foot in plantar flexion. The forward portion of the foot is grasped with one hand, the heel with the other hand,

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Fig. 1. Position for Lateral View of the Os Calcis.



Fig. 2. Position for Anteroposterior Roentgenogram to show the anterior portion of the os calcis. (See figures 12, 13 and 14). Note that the X-ray tube is directed toward the os calcis at a 25 degree angle from the perpendicular.



Fig. 3. Position for Standard Os Calcis Film. Following reduction the angles of the tube and film must be altered to compensate for the plantar flexion in which the foot is maintained.

and the sole of the foot is then pulled with sudden forceful thrusts against a vertical bar inserted in the usual slot in the middle of the table. After we have disimpacted the bones and restored the angle, the fragments are still loose and broadening is still present. An os calcis clamp is applied to squeeze the loosened bones further into position and to overcome the broadening. If the anterior portion of the os calcis is fractured, the clamp must be moved forward and re-applied to overcome any spreading which may be present in this portion of the bone. It is well to measure the width of the uninjured heel with the calibrated os calcis clamp and

when it is applied to the injured heel to close the clamp one-half inch more than on the well heel.

Roentgenograms should then be made and if reduction is satisfactory, the patient is turned on his back and a moderately padded boot cast is applied. The knee is held flexed, and the foot in full plantar flexion. The patient is pulled down on the table with the leg extending at right angles at the knee over the edge of the table. The surgeon sitting on a low stool molds the cast well under the malleoli and over the back of the heel, keeping firm traction over the back of the heel and with the sole of the foot resting on the surgeon's flexed



Fig. 4. Manipulation to Disimpact the Fracture. The patient is on his affected side with the heel of the injured foot extending over the edge of the table. A felt pad is interposed between foot and table.



Fig. 5. Procedure Following Disimpaction. The patient is still on his affected side. The sole of the foot is held 4 or 5 inches from the bar and is then brought with forceful thrusts against the vertical bar. This manipulation brings up the depressed posterior joint surface and restores the carrying angle.

knee to build up an arch in the drying cast. The knee is flexed and the foot is in full plantar flexion in all of the procedures.

The patient is allowed to be up on crutches in a few days and is discharged from the hospital, but is not allowed weight bearing. One month after reduction, the cast is removed, as union is then sufficiently firm so that a cast is no longer necessary, but not firm enough for weight bearing. The patient is instructed to move the foot actively and passively, and to use vigorous massage and manipulation for one month. At the end of this month, or two months after reduction, union is firm enough for weight bearing. The patient is instructed to walk on the foot, using his crutches, but is encouraged

to discard support as soon as possible. He continues his massage and manipulation and is taught to rise on his toes frequently to strengthen the plantar and calf muscles.

Massage and persistent use of the foot play an important part in early recovery. It is only by early mobilization that we can expect return of muscular and joint function. The patient is encouraged to return to work as soon as possible as only in regular prescribed work will recovery be hastened. We all know that unemployment breeds laziness and that it is easier to sit than to walk when some soreness exists in a foot.

I have personally treated sixty-seven cases with seventy-three fractures of the os calcis in the past four

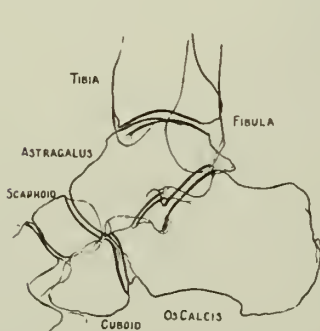


Fig. 6. A lateral view of the normal foot and the normal relationship of the bones of the foot and ankle with the os calcis.

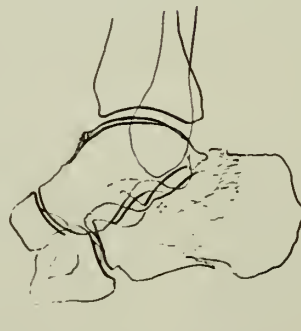


Fig. 7. Fracture of the os calcis. The joint surface has been driven down and the back portion of the heel bone pushed up and shortened.

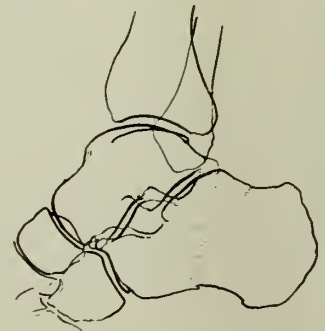


Fig. 8. Lateral view of the foot after reduction of the fracture. The broken fragments have been restored to their normal position.



Fig. 9. A plantar dorsal view of the normal os calcis.



Fig. 10. Discloses fracture. Shows displacement, broadening and shortening of the back portion of the heel.



Fig. 11. Fracture after reduction. The fragments are now in normal position and the bone compares favorably with the normal heel.

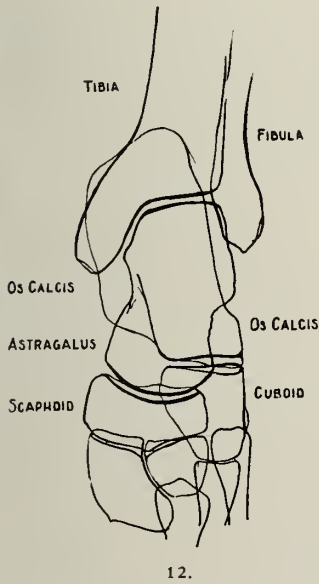


Fig. 12. An anteroposterior view of the normal foot, taken to show particularly the front portion of the os calcis.

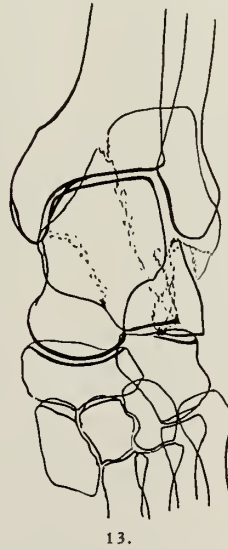


Fig. 13. Anteroposterior view showing the fracture extending into the front portion of the os calcis.



Fig. 14. Anteroposterior view showing the fragments restored to their normal position.

years. Results have continued to be uniform and convalescence definitely shortened. In the ordinary fracture disability from work will average three months from time of reduction. In the severe type, four to five months must be allowed before the patient can return to work. In the severe type some partial loss of motion in the subastragalar joint can be expected but this in itself does not necessarily cause disability. In this type

some pain and soreness may continue for several months to a year. However, the soreness will gradually become less as the roughened joint surfaces become smooth by the continuous polishing they receive in walking.

The diagrammatic drawings show an actual fracture of the os calcis before and after reduction and compared with a normal heel.

Fractures of the Metatarsal Bones*

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MOST industrial workers, which includes the majority of railroad employees, must earn their wages while in the upright position, either walking or standing on their feet. Fractures of the bones of the feet may, therefore, become of first importance from an economic standpoint, and poor results in their treatment are, consequently, the cause of many days of painful existence and eventually lead to semi-invalidism with subsequent loss in earning capacity. We, as surgeons, many times relegate the complaints of foot troubles in a patient to the not too skillful administrations of the boot maker or the chiropodist without giving the matter the careful study which the condition requires and demands.

A study of the anatomical arrangement of the bones, muscles, tendons, arches, and joints is not amiss. These show an intricate arrangement found no place else in the body. The disarrangement of any one of the parts can easily be the cause of distress and pain. A shuffling gait, pain in the muscles of the posterior part of the legs, backache and poor posture, headaches and many other chronic complaints must often be laid to foot conditions. Hence, they should not be passed over lightly as beneath the dignity of surgeons. A surgeon's skill and knowledge should be as available to these sufferers as to any other condition demanding his attention.

The bones arranged in three groups—the tarsus, metatarsus, and phalanges, fit into each other by projections and facets much as the stones of an arch, a remarkable arrangement by nature for their purpose, each bone separated by synovial cavities and held together by an intricate interlacing of ligaments, fascias, and muscles. These structures receive their nutriment from branches of the anterior tibial artery and anterior peroneal artery on the dorsum of the foot, and these have intercommunicating branches with the plantar surface connecting with the deep plantar arches of the external plantar and internal plantar vessels.

The musculocutaneous and anterior tibial nerves with their numerous branches control the muscle structures. The arches of the foot are (1) the longitudinal, extending from the heel to the heads of the metatarsal bones. This is the most important, with the posterior pillar at the calcanium and the anterior pillar extending through the metatarsals, and (2) the transverse arch across the foot at the tarso-metatarsal joints.

Use of Arches. 1. They give elasticity and springiness to the step as well as strength to the tread. (2) They protect the vessels, nerves, and muscles, and add to the height. (3) They give dignity to the person instead of the hobbling, painful appearing gait of the sufferer from flat feet.

These arches will not be preserved when there are multiple fractures of the metatarsal bones because of the dropping and flattening of the contour of the plantar surface. Consequently, it is of utmost importance to preserve their position and relation to each other and to the cuboid and three cuneiform bones. It is better to have good functional, rather than perfect anatomical, results. The five metatarsal bones situated at the anterior part of the longitudinal arch are therefore of great importance and warrant more than a passing study.

Each metatarsal is a long bone in that it has a shaft with distinct ends, each having slightly different contours owing to its different position in the transverse arch, each having many attachments for muscles and nutrient arteries which enter the shaft on the side. They ossify from two centers, the shaft being solid at the end of the third year, the shaft and epiphysis consolidated by the twentieth year. From a study of the foot it is evident how easily fracture of the metatarsals may take place, exposed as they are to trauma of all types. In our experience, stepping on uneven surfaces, slipping against hard objects, and even dancing have been among the lesser causes of fracture with non-displaced fragments, of the first and fifth metatarsals, while crushing by solid objects dropped on the instep, the foot being run over by automobile or wagon wheels, and falls from heights with the feet landing flat on the ground have been the causes of multiple, compound, and comminuted fractures of more than one bone, and in many of them all five metatarsals have been badly damaged.

Metatarsal fractures, relatively common, are often overlooked in the lesser degrees, but a history of direct or indirect violence, slight discoloration and swelling, pain on walking, leads one to the X-ray and a confirmed diagnosis. Here I wish to emphasize the need of the X-ray. We are prone to pass over slight injuries too lightly. *X-ray them all.* A small crack diagonally across a metatarsal with continued walking without proper support may lead to deformity and a very painful permanent disability.

In multiple fractures, the large amount of swelling with marked discoloration and hemorrhage makes of the feet but dark colored bags filled with fragments, and the X-ray must confirm not the diagnosis of very evident fracture but the extent and position of the fragments—manual palpation being impossible. Crepitus is present, usually, and can be elicited but tells us nothing but the confirming of multiple fractures. Treatment of these fractures not only tests the ingenuity of the surgeon and becomes a source of long drawn out treatment, but, because of the insistence of the patient on quick results, in what he feels is a minor matter, leads one to minimize the danger of too early use of the parts with disastrous results because of displacement of fragments due to too

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soft callus which cannot support the weight imposed upon it. Time is an element. Six weeks at least should be allowed in uncomplicated simple fractures. Six months is not long enough in many multiple comminuted ones. Judgment and common sense are much in demand in the determination of the time element.

Simple fractures without displacement can be treated by the application of a plaster cast covering toes and extending to the ankle. After its removal a plantar support should then be applied followed by a proper supporting shoe.

Open fractures of the metatarsals are serious injuries because of lowered resistance, grave chance of infection, and marked danger of gangrene; the fracture is ignored for the time being and all energies bent to control infection and pus formation, drainage being instituted when necessary because of infection—then reduction and casts or splints as seems most expedient. Careful X-ray studies should be carried out frequently because of the possible destruction of bone tissues. Osteomyelitis calls for curettage and removal of destroyed bone as elsewhere in the body.

In the care of multiple fractures we must remember four conditions; namely, (1) the restoration of the arches, (2) the reduction of the fractures, (3) the time element before use, and (4) the removal of spurs, deformities, or ossification between fractured members.

The arches are restored by properly kneading the foot into shape, the application of proper support, and firm elastic pressure around the instep. The reduction to anatomical perfection is most difficult; manual manipulation always under an anesthetic and open reduction if necessary with extension through the toes and counter weight applied through leg and heel will usually suffice. Here again we need frequent X-rays. The time element must not be under-estimated as it is weeks and many times months before firm callus is formed and weight bearing allowable. Then proper support by shoes built up on the inner side of the heel and sole to help the transverse arch, and the insertion of felt inner soles in the shoes will make walking easier. Ossification between the broken shafts is frequent and spurs on the dorsum of the foot which become painful must both be removed by operation. Frequently the breadth of the foot is too great, the shoes will not fit, and deformity of the fifth metatarsal becomes so pronounced that removal is necessary. The entire fifth toe down to the cuneiform metatarsal joint should then be removed. This is easily accomplished and a near normal looking foot obtained.

CONCLUSIONS

There are four important considerations in the treatment of fractures of the metatarsal bones of the foot:

1. A restoration of the fragments to as good anatomical position as possible.
2. Treatment of ecchymosis into the tissues and careful attention to the injuries and tearing of the muscular structures.

3. Restoration of the two planes of the foot that the usual spring and elasticity may be preserved, walking be normal, and the feet be made capable of carrying the weight imposed upon them.

4. The obtaining of a firm solid callus before weight bearing is allowed. To help this various drugs and vitamins should be given to promote calcium deposit.

CASE REPORTS

The following cases illustrate several points herein emphasized.

Case 1. W. E., age 45 years, S., laborer, weight 240 pounds. This man presented himself at 2:35 P. M. on 11-13-'34 in severe shock and complaining severely of his feet, legs, and back. He gave a history of having fallen 30 feet from bridge, landing on his feet on rails below. Feet were severely swollen, and skin felt as though filled with pieces of metal in a sac.

X-rays taken on entrance showed multiple fractures of all bones of foot and ankle—also severe compression fracture of lumbar vertebra.

Treatment from Nov. 13, 1934, to March 10, 1935, was as follows: (1) Heat for shock and sedatives for pain. (2) Wet heat applied to feet for swelling, with elevation. (3) Feet molded into fair shape. (4) Casts applied from knee to ankle incorporating angle irons extending along sides of foot to above toes. (5) Compression bands of rubber around instep of feet with rubber bands to cross bar with adhesion extension to each toe. (6) Plaster cast for compression fracture of spine extending from thorax to pelvis.

The patient was discharged from hospital walking from room on March 10, 1935.

He entered hospital again on Dec. 27, 1935, because of deformity of fifth metatarsal of left foot making it impossible for him to buy shoes to fit both his feet. Under ether anesthesia the entire toe down to the tarso-metatarsal joint was removed on Dec. 28, 1935, and he was discharged from the hospital January 15, 1936, entirely healed and walking with only slight limp.

Results and Deduction: (1) Bones healed with deformity but good function. (2) Both arches preserved to a marked degree. (3) Complete recovery from fracture of vertebra. (4) Removal of toe allowed fitting shoes to both feet and facilitated walking to almost normal. (5) Long period of rest in bed because of fractured vertebra made healing of feet and solid callus formation in the multiple fracture of feet more certain.

Case 2. H. P., age 34, M., farmer. The patient presented himself at 3:30 A. M. on Nov. 6, 1938, complaining that his left foot had been run over by an automobile.

Examination revealed the following: Foot badly swollen, severe hemorrhage, tender to palpation and movement. X-rays taken showed fractures of second, third, fourth and possibly fifth metatarsal with some displacement. Fracture of navicular bone and evidence of marked trauma to tarsal bones.

He was put to bed, foot elevated, sedatives for pain administered. On Nov. 15 a split cast was applied to foot. On Nov. 16 he was discharged from hospital on crutches. He was given calcium and vitamins A and D to promote calcification. On Jan. 5 an X-ray showed good callus formation. On April 5 an X-ray showed foot well-healed, normal size, transverse arch normal but longitudinal arch slightly depressed.

Results and Deductions: (1) Bones healed with bridge between third and fourth metatarsals. (2) Due to not being able to control his walking for a long enough time, there was a slight dropping of the longitudinal arch giving him a slight limp. (3) Calcium and vitamins A and D we believe assisted in the healing.

Emergency Ophthalmology*

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THE average physician takes little interest in ophthalmology in the large centers as he usually has access to an ophthalmologist to whom he can refer his eye cases. Because there are exceptions to this fact, I am presenting a few of the simple rules which may some time be of service to you.

ATROPIN

Many are afraid to use atropin because they think of the danger of glaucoma. Atropin may be used safely and is indicated in severe eye injuries, as, frequently we see cases where a few drops of 1 or 2 per cent solution of atropin sulphate would have saved an eye. The failure to use it at a time when it would have caused the pupil to dilate resulted in permanent adhesions which later could not be broken away.

The differential diagnosis between acute iritis and acute glaucoma is not clear to many physicians. In acute iritis, the iris is congested, thickened, and has lost its luster, the result being that it occupies more space than normal, therefore the pupil is smaller than the fellow eye. Glaucoma, on the other hand, produces a condition just the opposite. The increased tension caused by an enlarged vitreous body pushes the lens forward and mechanically spreads the pupil until it is larger than its fellow. The increased tension causes a corneal haze and the observer should be able to differentiate between a corneal haze and a cloudy aqueous and lusterless iris. The corneal haze is more like ground glass. The taking of ocular tension by other than one of experience is not dependable.

One other symptom should be taken into consideration and that is pain. The pain of acute inflammatory glaucoma is many times greater than that of iritis. It is often so great as to cause delirium, nausea, and vomiting. This symptomatology may divert the attending physician to other parts of the body and in turn overlook the real cause of the trouble. It is suggested, as a routine, when the above symptoms are present to always examine the eyes. If one or both eyes are red, pupils dilated, cornea steamy, you need not look farther for a cause. It is acute glaucoma of the most malignant type and to know what to do and do it at once may mean the saving of the patient's sight. Delay of a few hours may mean blindness.

There are two things you can do in this emergency. One is to drop in the eye a $\frac{1}{2}$ per cent solution of eserine every five minutes until six drops are given and to constantly massage the eye. The second is to give the patient a bottle of citrate of magnesia, while your oculist will probably operate to prevent another attack.

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HEAT AND COLD

There are two great indications for the use of hot and cold applications to the eyes: cold in traumatism, and heat in deep idiopathic inflammation of the eyeball. The use of these two remedial agents is very simple.

Cold: Place a block of ice in a basin. Tear up old muslin into 3-inch squares, double twice to make a pledget $1\frac{1}{2}$ inches square and four-ply in thickness. If one eye is to be treated, two pledgets will be enough; if both eyes, four will be needed. After the pledgets are wet, the eye is covered and changed every half minute as long as the eye or eyes feel comfortable. Do not use an ice bag directly over the eye.

Heat: A basin of water is provided and kept to a temperature as hot as the hand will bear. The best agent to convey this heat to the eye is a flannel cloth. It is better than cotton as it is tighter and not so soggy. Hot applications should not be continued longer than 15 or 20 minutes.

INJURIES

Ocular injuries caused by chemical and thermal agents: A large percentage of these cases are first seen by the general physician. It should be your aim to give relief and at the same time neutralize the cauterizing agent so it will do no further damage. In a percentage of cases the damage is almost instantaneous.

The tears neutralize and wash out the offending agent. The exception to this is when the eye is filled with unslacked lime or any material containing a portion of unslacked lime. In this case the tears only aid the action of the lime, so all particles should be removed and a bland oil such as olive oil, castor oil, or liquid petrolatum instilled into the eye, atropin used and then a bandage. To attempt to neutralize an acid burn with an alkali, or an alkali burn with an acid is not practical; a bland oil is much better.

There still are men who use cocaine as part of the after treatment in such cases to relieve pain but this is a grave mistake as cocaine swells the delicate epithelial layer of the cornea, lowering its resistance and in turn opens up an avenue of infection. Cold applications are much better, in fact the best remedy for the relief of pain in such cases.

Common molten metal when dropped on a wet surface explodes; that is why a burn of this type is always deep and, therefore, serious. The adhering metal must be removed, atropin should be used and measures taken to keep down infection, otherwise an ulcer may form which may produce disastrous results.

PENETRATING WOUNDS

Penetrating wounds may be due to almost any kind of missile. When produced by any material such as lead or steel, always assume the foreign body has pene-

trated the eye and have the eye X-rayed at once. The oculist sees a surprising number of patients who have been dismissed by their physicians with assurance that the foreign body did not lodge in the eyeball. Later an X-ray discloses a foreign body within the eye. The physician cannot exonerate himself if he "supposes" when he has access to an X-ray which will eliminate all supposition.

Every physician who is willing to do emergency ocular work should have on hand, $\frac{1}{2}$ per cent or 1 per cent solution of the synthetic anesthetics such as butyn or pontocain, a 1 per cent solution of atropin sulphate, a tube of 1:3000 bichloride ointment, and $\frac{1}{2}$ of 1 per cent solution of eserin sulphate, as well as a few 3-inch square gauze pads in paper containers which can be held on the eye by small strips of adhesive. A small amount of sterile cotton under the pad will keep the eye closed. Always moisten the cotton with a little water as the small filaments of cotton may enter the eye and are quite irritating.

FOREIGN BODIES IN THE CORNEA

I wish to point out a fault in technic which is very common in removal of foreign bodies from the cornea and which causes much delay in the healing of the corneal wound. Hot particles of emery, hot cinders, and oxidizable particles of metal, burn the cornea at the point of contact. This burned area in which the foreign body is imbedded as well as the foreign body itself must be removed. If this is not done, the burned area must slough out and in so doing infection may set in, delaying resolution and loss of time to the patient as well as a corneal scar which may be so located as to incur a loss of vision. An eye with a foreign body burn should be bandaged until the wound is healed. The way to tell this is to stain the cornea with a 2 per cent solution of methylene blue. If a physician expects to remove foreign bodies from the cornea he should provide himself with a good sharp foreign body spud, a binocular loupe, and a condensing lens.

The Management of Opacities of the Cornea*

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THERE is no greater tragedy in ophthalmology than an eye that is perfectly normal except for an opaque cornea. It is like having an expensive camera and being unable to remove the lens cap. All the other structures of the anterior segment may be intact,—the muscular and accommodative apparatus in perfect order, the posterior segment unimpaired, the retina and optic nerve normal and capable of transmitting images to a normal brain—and yet the organ is useless because visual images cannot reach the retina.

Opacities of the cornea vary of course in size, and in density from a slight cloudiness or nebula to the more dense maculae and the absolutely opaque leucomata. While the dense opacities provide many and difficult problems, even thin, diffuse nebulae often produce annoying subjective symptoms,—photophobia, lacrimation, fatigue, etc. Occasionally a case comes to litigation in which superficial examination seems to show no opacity and yet more careful investigation reveals a delicate corneal haze. Such slight obstruction to vision may scarcely be noticed by the individual himself when he is fresh and free from fatigue, but with the strain of the day's work some redness and vascularity and other annoying subjective symptoms appear. In fact dense and well-defined leucomata often produce less annoyance to the subject than the thinner opacities, the reason being that

while a dense scar permits of no light reaching the retina and hence a definite scotoma exists corresponding to this area, a haze allows some light to filter through and these indefinite images interfere with vision.

The anatomy of the cornea is simple. Two elastic membranes form the anterior and posterior boundaries of the substantia propria. The anterior is Bowman's membrane, on the outer surface of which is the epithelial covering, viz., several layers of basal cylindrical cells, gradually merging into flat epithelium. The inner limiting membrane (Descemet's) supports on its inner surface a single layer of endothelium. Within the stroma are fixed and wandering cells, the latter ordinary leukocytes. Being avascular all pathological processes are sluggish. Nourishment is by dialysis from the periphery. Any slight deviation from normal tissue tension may produce a serious oedema. And oedematous corneal tissue readily loses its superficial cells and produces an ulcer.

In order to see, all corneal structures must be completely transparent. Loss of corneal substance results in an ulcer. The denuded area is filled by granulation tissue which soon becomes fibrous and finally is transformed into connective tissue. The deeper the ulcer the more dense the scar and the more serious and permanent the effect. Superficial epithelial cells are quickly replaced, the area remaining transparent. Where the ulcer involves Bowman's membrane and even the outer layers

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From the ophthalmic clinic of the University of Oregon.

of the stroma, the replaced tissue may still remain transparent. But let the trauma involve the deeper layers of the stroma and an opacity results.

Examining the pathology of repair more explicitly, we find that epithelium is deposited promptly over the denuded area and later is pushed up toward the anterior surface by the regenerating stroma. Bowman's membrane once destroyed is not reformed.

Ulcers may be caused by trauma or by keratitis, but other conditions productive of corneal opacities must also be mentioned.

Scars at birth. Occasionally we see an infant in whom one or both corneae are opaque at birth. The opacity may involve the entire cornea or only portions of it. It has never been satisfactorily determined whether these are from maldevelopment of the cornea or are the product of intra-uterine inflammation. In either case the condition may improve with time or it may remain stationary. Sometimes it is a forerunner of a buphthalmos.

Arcus senilis must be mentioned in this connection, though of no pathological significance. It probably is due to a fatty degeneration of the cornea near the limbus, and while it usually is an accompaniment of age it may even be seen in early adult life.

Transverse calcareous film is a flame-like opacity in the form of a band across the cornea of each eye sometimes in eyes otherwise normal as well as in those affected by glaucoma and iridocyclitis. Age and iridocyclitis may be factors in its origin. The condition was first described by Bowman in 1849 who restored vision by scraping off these lime deposits. They will sometimes yield to repeated touching with weak solutions of hydrochloric acid.

Blood stain of the cornea accompanies hemorrhage into the anterior chamber. It decreases gradually from the periphery and is often confused with a dark cataract. There are no cellular elements present and the staining from hematin, derived from the hemoglobin, takes place in time.

Interstitial keratitis. The opacities resulting from this condition must not be omitted from our resume. They usually clear up surprisingly well, especially in young subjects, but practically always leave a diffuse central haze or gray zig-zag lines or curious geometrical patterns. Also there remain through life fine opaque lines running to the opaque areas. These are the persistent empty blood vessels, and are permanent proof of the previous existence of interstitial keratitis, and an evidence of hereditary syphilis.

TREATMENT

Medical. Fortunately there seems to be a natural tendency for scars to become thinner with time. This circumstance may account for favorable reports on the many drugs used in the eye for removing opacities, viz., mercury, dionin, jequirity, powdered calomel. Quinine bisulphate in ointment form perhaps gives as good results as any. Excellent results have been published following subconjunctival injections of iodine, sodium chloride, sodium salicylate, magnesium salts, etc. All of

these are designed to stimulate absorption by increasing the vascularity to the part. Lime burns of the cornea should be treated promptly and often with a 10 per cent neutral solution of ammonium bitartrate. This is almost a specific if used early and frequently.

Physical. Massage, electrolysis, galvanism, diathermy, electro-massage, ultraviolet ray, X-ray, radium, ionophoresis with iodine, potassium iodide, sodium salicylate, etc., have each been favorably noted by observers. But as remarked above it is possible that the curative power of nature may after all be the essential factor in the clearing of the opacities.

Refraction. Careful refraction is most important in these cases. Astigmatism or irregular corneal curvature may have been produced by contraction of the scars. In some cases the use of stenopaic disks and slits are useful in improving the vision.

Tattooing. Where only a cosmetic effect is desired, a round black pupil may be tattooed at the center of a completely opaque cornea. It may also sometimes be employed to good advantage to lessen the amount of irritation from light reflected on a scar. Or an area of clear cornea may be outlined by the india ink to give more definite outline to a hazy scar.

Optical Iridectomy. If an area of clear cornea can be found, the removal of a piece of the iris back of it is often a desirable and useful procedure. This is known as an optical iridectomy. No matter what the position obtained for this artificial window, vision will be greatly improved as images will then fall somewhere upon the retina even if not upon the macula. Unfortunately, however, there are two factors that often tend to lessen the success of an optical iridectomy. In the first place peripheral refraction must be depended upon for vision. This is never as clear as central refraction. And second, despite the fact that we seem to be selecting a clear area of cornea, when once the iris in this region is removed and the cornea is seen against a dark background we find there is a uniform thin haze present.

Surgical removal of scars. Dr. Meyer Wiener of St. Louis in 1926 and Dr. W. L. Benedict of Rochester in 1934, described methods for removing these opacities surgically. Without describing the procedure in detail, I may say it consists essentially of peeling off as much as two-thirds or three-fourths of the anterior layers of an opaque cornea. Starting with a cruciform incision, each quadrant is raised from the center of the cornea. Care must of course be taken to remove the same thickness of tissue in all quadrants. Benedict uses a quadrilateral incision and starts the peeling at one corner. The end result of this operation is usually good. The surface epithelializes surprisingly promptly and in a few days will not take a fluorescein stain. No phenomenal improvement in vision is ever obtained but the regenerated structure is thinner and more translucent than the removed tissue and even a slight increase in peripheral vision and appreciation of motion is extremely valuable to the patient.

Corneal Transplants. The past few years have seen tremendous increase in interest in this procedure. For

many years efforts were made to replace opaque cornea with normal transparent grafts from other eyes. An immense amount of experimental work has been done with this object in view and the literature relating to it is voluminous. The first thought of the laity is "why can't the clear cornea of an animal be substituted?" But no experiment involving a heterogenous tissue has ever met with success. Within the past few years encouraging results have attended operations substituting a disc of clear human cornea for the opaque cornea. Filatov of Odessa even uses the corneae of cadavers dead for one or two days. He has reported some 400 cases with favorable results. Castrovejo of New York has also done much work along this line. He makes use of corneae from eyes that have been enucleated or that of a foetus. In general it must be said that the procedure is not yet perfected, that results are often uncertain and that considerable deformity persists. A visual result of 20/70 may be regarded as extremely satisfactory.

CONCLUSIONS

Corneal opacities, whatever their origin, prevent the proper functioning of an eye that is normal in other characteristics. Hence any measures tending to alleviate this defect even if but partially, are to be welcomed.

Three factors are to be kept in mind as influencing permanent results: (1) the age of the patient, (2) the density and extent of the scar, and (3) its duration. As stated, all corneal opacities have a tendency to clear up with the passage of time. The thinner the opacity the more probable is improvement. The younger the patient the better the outlook.

Much can now be done surgically for these conditions that was considered impossible a few years ago. Even a slight increase in visual acuity, particularly if accompanied by an increase in peripheral vision, is greatly to be desired.

Traumatic Appendicitis*

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APPENDICITIS attributed to trauma should be considered by this organization of Railroad Surgeons. I have not yet heard of a case of claim against a Railroad Company for this condition caused by train traveling, nevertheless I feel that it may develop in the not too distant future. Only last summer, I was asked to meet a train coming from Seattle to Portland on which a passenger had become acutely ill and needed medical attention. The patient was a middle-aged lady who was suffering from acute upper abdominal pain brought on by the jolting, sudden stopping and starting of the train. The engineer was criticised by the husband as being untrained and not fit to be in charge of a passenger train. His wife, who was acutely ill, was taken to the hospital in an ambulance.

The patient, after a thorough examination, was found to be suffering from acute gallstone colic. On further questioning, it developed that she had had several similar attacks. Now if people are claiming that acute gallbladder attacks are a result of being jostled about while riding on passenger trains, I do not think it will be long before appendicitis will be placed in the same category.

This brings up the question: Can trauma bring on an acute attack of appendicitis? I can find no better answer to this than the editorial in the *Journal of the American Medical Association*, June 4, 1938. After carefully discussing "Trauma and Appendicitis," including a review of the literature and opinions of many noted surgeons,

the author concludes with the statement that it is the opinion today that not only can trauma precipitate a clinical attack of acute appendicitis but that also the attack may result in grave and serious consequences.

The stomach, especially after a full meal, and the third part of the duodenum in its fixed position across the vertebral column, have certainly been ruptured as a result of trauma. The solid abdominal organs, such as the liver, spleen and kidneys, are not infrequently torn and ruptured and our program today is concerned with several cases of trauma affecting abdominal organs. When one searches the literature, one can find plenty of cases of so-called traumatic appendicitis. It apparently does occur and it has occurred but it is nevertheless, on first consideration, hard to believe. We must admit that traumatic appendicitis is a definite clinical entity.

Let us think of trauma not as a direct injury to the appendix as in the case of the liver and spleen but as trauma applied to the abdominal wall and its contents which consist not only of solid organs but of gas and fluid as well. This means that force can be transmitted in all directions and therefore that the contents of the cecum and even the ascending colon can be forced into the appendix. I think we can imagine the appendix being so distended as a result of this force as to possibly rupture the mucosa and thus offer an avenue for the ever present infectious organisms to invade the wall of the appendix and start an acute inflammatory condition. I think that we can also imagine the presence of a fecalith in the lumen of the appendix, and this same trauma

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causing the foreign body to injure the mucosa of the appendix and again leave an avenue for a source of infection. And we can further imagine this same fecalith or foreign body as the case may be, blocking the exit of gas and contents from the appendix and permitting swelling and possible perforation to result.

The radiologists tell us, following the use of barium enemas and barium meals, that with very little pressure, barium can be forced from the cecum or from the ascending colon into the appendix. Furbringer and Von Hansemann have been repeatedly quoted as being able to express the contents of a full cecum into the appendix by light pressure over the cecum; also by pressure over the ascending colon.

A case reported by N. A. Ludington fits this condition perfectly:

A schoolgirl, age 19, feared that she had appendicitis on account of some transient right lower abdominal pain which recurred at intervals. She had previously experienced two brief attacks of appendicitis at intervals of two or three years. During the present attack, she was well relaxed when examined. The abdominal wall was thin and a very careful deep palpation over the abdomen, especially over the right lower quadrant, failed to bring out any evidence of appendicitis. But, before leaving the physician's office, she complained that the examination had made the whole right lower abdomen ache. Reassured, she left for home. The ache continued to grow worse, vomiting followed and early the next morning, sixteen hours after the abdominal examination in the physician's office, a sudden sharp pain in the right lower abdomen was followed immediately by an exploratory operation and a perforated appendix was removed.

Note this case well. The patient had had previous attacks of appendicitis but was examined at a time when she was free from trouble. There was no evidence of appendicitis at the time of her examination but before leaving the physician's office, trouble started. This, it seems to me, should be almost conclusive evidence that trauma even of a mild nature, such as abdominal palpation, can bring on an acute attack of appendicitis. In this case, however, inflammation occurred in an organ which had previously been the seat of trouble.

Now let us consider the possibility of trauma causing an acute attack of appendicitis in which there has been no previous history of such trouble. There are many cases on record to illustrate this condition. One case is sufficient — that reported by Dr. Willard White in *Minnesota Medicine* and read before the Minnesota Surgical Society, March 5, 1931:

"Not long ago," writes Dr. White, "I was present at an autopsy which was performed on the body of a young man who received an injury to his abdomen and who had subsequently developed appendicitis and peritonitis and died. The history was that this man had apparently been well until September 30, 1929, when, while cranking an auto truck, the engine backfired and the handle of the crank struck him in the abdomen so that he complained of pain to a fellow workman who was with him at the time. They finally got the motor started, and he drove the truck a number of blocks and left it at his destination. He went home and complained to his wife that he had pain in the abdomen. He sat down to dinner, ate very little, and, although there was company at his house for dinner, he went to bed very soon after the meal, stating that he did not feel well. He vomited early in the evening and slept very little during the night. The next day his pain became more severe but gradually subsided. A physician was called

who obtained the history as just outlined, examined the patient and stated that in his opinion the man was very likely suffering from appendicitis but that he probably was over the worst part of the attack and that he probably would recover without operation.

"On October 4, four days after the blow on the abdomen, the same physician was again called and found that the symptoms were much worse. He had the man sent to the hospital and operated on him the same evening, and found a gangrenous appendix incompletely walled off and a small amount of pus. The appendix was removed and drains were inserted. (On entrance to the hospital, his temperature was 100.8, pulse 103.) From the fourth postoperative day on, there was an increase in the temperature and pulse rate and at times he was irrational. He died on October 13, 1929, fourteen days after the accident and nine days after his operation. He was buried. Later, the question arose of the relationship of the blow on the abdomen to the development of the appendicitis and death, and an autopsy was performed on November 23, 1929, about six weeks after his death. Definite evidence of peritonitis was found. There was no dispute about the fact that he had appendicitis and peritonitis. Apparently there was no question about the fact that he received a blow on the abdomen which caused him to complain, nor that he was feeling well up to the time he received the blow and that symptoms began soon after."

Very, very seldom will a case of traumatic appendicitis be operated on soon enough to show evidence of injury before this evidence is obliterated by signs of resulting inflammation, but this lack of scientific evidence must not throw out the diagnosis of traumatic appendicitis. When we realize, as has been shown in a very exhaustive article appearing in the *Proceedings of the Royal Society of Medicine in London*, May, 1916, that foreign bodies of all kinds from fecaliths, seeds and bristles to particles of enamel ware from cooking utensils and small pieces of steel from steel rollers in flouring mills and even shot and iron nails have been found in the appendix, then we can see the possibilities for the development of traumatic appendicitis, especially when foreign bodies are present in the appendix.

Sprengel contends that there never has been a case of traumatic appendicitis scientifically proved. This we can understand, because although the appendix may have been torn by direct violence and its walls lacerated, the time elapsing between the receipt of the injury and the development of the inflammatory process has permitted the inflammation to obliterate all evidence of mechanical injury.

Fowler, after a very complete investigation and study of traumatic appendicitis concludes that: (1) Appendicitis is a disease and not an accident; (2) Appendicitis cannot be produced by trauma alone, that bacterial infection is necessary. With this I agree but I cannot agree with his rigid requirements necessary for diagnosing acute, genuine, primary appendicitis, especially when he says that true traumatic lesions such as frank contusion, hematoma, rupture or laceration must be demonstrated at operation. It has already been shown why we cannot show these conditions at the time of operation even though they were present immediately following trauma.

I have seen as a result of trauma, rupture of the liver, spleen, kidney and even of the stomach with the contents of a full meal spread throughout the peritoneal

cavity, but I am not sure that I have seen a case of traumatic appendicitis. My own case I have always considered one of doubtful traumatic appendicitis. My patient, however, to this day feels that his appendicitis was a result of injury and felt so strongly about it that he consulted his lawyer in an attempt to collect compensation on an accident insurance policy. On my informing the lawyer that I couldn't honestly consider the case one of traumatic appendicitis, the suit was dropped. I also was dropped from the patient's calling list and he proceeded further by going into bankruptcy and refused to pay his hospital and doctor bills. This man, age 54, had a ruptured appendix with abscess formation and localized peritonitis. During his hospital stay, he was a most grateful patient, his life had been saved and everything was quite satisfactory but on my refusing to support his claim that his appendicitis was due to accident so that he could collect insurance and get compensation, the proceedings outlined above took place. His accident was caused while at work. He was accustomed to handle stoves in the shipping department of

a large stove factory. In so doing, his foot slipped and he fell landing flat on his abdomen on the concrete curb below. This was followed by two months of abdominal pain, finally coming to a head after spading in his garden in a fulminating attack of acute suppurative appendicitis with peritonitis. This case occurred two years ago. Ever since that time I have been looking into this subject of traumatic appendicitis more or less thoroughly. I am wondering if I did not do this man an injustice by not calling his illness one of acute appendicitis of traumatic origin. I do not know.

But I do know this—when I started preparing this paper, I began with the idea that traumatic appendicitis was somewhat of a doubtful condition, one that needed to be questioned and thoroughly investigated. After looking through the literature and examining the evidence, I finish this paper with the idea that traumatic appendicitis is a definite clinical entity and as such must be recognized not only by us as physicians but also by the Courts in questions of litigation and compensation.

Traumatic Rupture of the Kidney*

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RUPTURED kidney resulting from trauma often presents a dramatic incident which merges into a tragic finale. Shock on the one hand may discourage prompt and early action and delay may on the other hand lead to ultimate loss of the injured kidney. Grave and puzzling responsibility therefore punctuates the progress in handling of such injuries.

Manipulative methods of urological diagnosis, such as cystoscopy and ureteral catheterization, are usually discouraged because of the possibility of complicating infection. But fortunately we have at our disposal today the excretory dye, which when combined with the use of good X-ray technique, will reveal much information concerning both the injured and the uninjured kidneys.

Men constitute three quarters of the number of patients with traumatic rupture of the kidney. Occasionally the injured organ is found to be the only kidney the patient has.

The first case to be presented here was the result of a somewhat unusual type of injury:

In November, 1934, a Norwegian laborer, aged 61, and weighing 228 lbs., while attending to his work in a barn, trip-

ped on a wire and fell across a pail standing upright on the barn floor. He felt pain in his left side and back almost immediately and soon after the urine was bloody. He was admitted to the hospital with these stated symptoms plus a definite tenderness over the left kidney area and a palpable mass there. The man at first was not very ill, but at the end of ten days the palpable mass was larger and the temperature curve was rising. Exploration at that time revealed a gross retroperitoneal hematoma and a kidney which, when removed, was almost completely severed in the middle showing the pelvis badly torn. The renal vessels were avulsed near to the hilus. There was necrosis present and the kidney was plainly doomed from the moment of injury. The man made a good recovery after nephrectomy.

The second case I wish to report occurred in a man of 32, also heavy-set, who received his injury in an auto accident. This patient was unconscious eight hours. When consciousness returned, he complained of pain in his head and abdomen and his physician noted blood in the urine and in the stools. The patient's abdomen was tender but he was not in shock. The eyegrounds and accommodation were normal. X-ray showed a fracture of the temporal bone on the left. Abdominal distention began and the white count was 14,600. He was tender in the liver area and in the cecal region. Abdominal exploration was performed on the third day. Blood stained peritoneal fluid in moderate amount was found. The ascending colon and mesentery were congested but there was no laceration. In the liver region there was some bile stained fluid but no rent in the liver was found. A mass was palpated on the right side. This was retroperitoneal and in the region of the right kidney.

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FIGURE 1
TEN AUTOPSY CASES SHOWING RUPTURED CASES

Male or Female	Age	Nature of Injury	Kidney Lesion Severe or Mild	Associated Pathological Conditions
Male	17	Football. Blow in abd. Lived 13 days.	Severe	Jaundice. Dil. R. vent. Atelectasis and pul. edema. Conges. liv., spl. and kidney.
Male	57	Auto Accident. Died same day.	Mild	Fract. skull, crushed chest and hemothorax, rupt. liver, L. kidney; hemoperitoneum; comp. fr. right leg.
Female	21	Auto Accident. Lived 3 days.	Mild	Rupt. spleen and R. kidney; hemoperitoneum; hemorr. R. adrenal. Fr. clavicle; multiple fr. ribs with hemothorax.
Male	27	Auto Accident. Died same day.	Mild	Broken neck, extra dural hemorr., vertebral canal. Rupt. spleen and hemoper. Fr. pelvis. Rupt. kidney 4 cm. long 1 cm. deep. Retroper. hemorr. Edema lungs. Superficial injuries.
Male	50	Struck by auto. Died in ambulance.	Mild	Rupt. R. kidney 2 large lacerations extend 2 cm. into cortex. Fr. ribs, humerus, pelvis; broken back, rupt. lung, hemothorax; retroper. hemorrhage and external injuries.
Male	35	Struck by auto.	Severe	Rupt. L. kidney and extensive retroper. hemorr. Crushed chest, hemothorax. Rupt. spl. and liv.; hemoper. Comp. fr. arm and both legs and external injuries.
Male	52	Struck by auto. Died few hours.	Severe	Rupt. R. kidney, extensive retroper. hemorr. Fr. humerus, tibia and fibula; mul. fr. ribs and lac. peri. External injuries.
Male	46	Struck by auto. Died 5th day.	Mild	Rupt. R. kidney; lac. hilus 2 cm. long; fr. skull; basal cerebral hemorr.; rupt. liver; retroper. hemorr.; fr. ribs, tibia, fibula, radius and ulna.
Male	48	R. R. Accident	Mild	Rupt. L. kidney, 2 lac. lower poles 1.5 cm. long (each) grade 4; hemorr.; fr. radius, ulna, femur, ribs; cerebellar hemorr.
Female	58	Not stated. Diabetic.	Mild	Rupt. R. kidney; extensive retroper. hemorr. diaphragm to pelv. brim.; cirrhosis liv. grade 3; pn. infarcts lung; mitral defect; edema of meninges; hydrothorax.
8 Male 2 Female		7 Auto. 1 Railroad. 1 Football. 1 Not stated.	7 Mild	All accompanied by multiple lesions of other organs sufficient to cause death.

It was estimated to be about three times the size of the normal kidney. The abdomen was closed without drainage. The patient, having had a fracture of the cranium and an emergency abdominal exploration, besides other external injuries acquired at the time of the accident, was kept under observation and on supportive treatment. On the twenty-ninth day of his hospitalization, exploration of the right kidney region was attempted because of gradual increase in the size of the tumor and of increasing pain and tenderness. A large fluctuating mass was found, which, when opened contained over a quart of urine in the retroperitoneal space outside the kidney. The kidney was found to be ruptured in two places—one on each side—and the pelvis was torn off. Considerable bleeding was encountered. The patient was fat, the wound deep, and the tissues fragile. Nephrectomy was successfully accomplished, however, and the patient was discharged well on the fifty-first day.

Many cases are in the records, less serious in nature, wherein rupture of the kidney or injury sufficient to be recognized or strongly suggested by hematuria are not operated upon and the patients seem to make good recoveries. This was noticed in reviewing the records of St. Luke's and St. Mary's hospitals in Duluth. The very serious injuries, however, such as those chosen for this report, especially those with multiple injuries to other organs as well as to the kidney itself fall readily into the surgical category. But the borderline cases are the ones creating the greater problems and fix on the attending physician the responsibility in some instances of sacrificing or saving of the kidney.

Judd called attention to this point in 1919 at which time he reported eight successful operations for contusion and rupture. He made the observation that it is possible because some of the slightly injured kidneys have healed spontaneously that the expectant treatment

in other less favorable cases has been carried too far; whereas an earlier exploration might have saved the injured kidney; and that after infection has taken place it is not possible to pack the rent in the kidney or clear away the clots and suture the wound with any degree of success.

Goldman, in 1918, reported the case of a woman of 23 who was successfully operated upon, though the pelvis had been torn off and the kidney itself ruptured into five pieces and with a huge blood accumulation. There was no hematuria in this case—a finding ordinarily so valuable in diagnosis. Angevine, in Germany, recorded the case of a child of 8 under his care with ruptured kidney after a fall of 12 feet. Hematuria was delayed in this case until the sixth day, microscopically, and the seventh day, grossly, after operation which was performed eight hours after injury.

There were 5 cases treated surgically in our series at the Duluth hospitals. Four of these were injured as the result of auto accidents. One man of 54 was struck while intoxicated and died within a few hours. All of the patients were men. Nephrectomy was performed in 2 and exploration or conservative repair in 3. All showed hematuria. Recovery occurred in all but the one mentioned.

From the autopsy records at the University of Minnesota I have tabulated 10 cases. (Fig. 1.) It will be seen from this tabulation that ruptured kidney resulted from auto accidents in 7 of the 10 cases. There were but 2 women in this group making the percentage of occurrence 80 per cent males. It will be seen that those cases

FIGURE 2
25 CASES RUPTURED KIDNEY FROM THE LITERATURE

Doctor or Case No.	Male or Female	Nature of Injury	Right or Left Kidney	Oper. or No	Nephrectomy	Repair	Hematuria	Recov. or Death	
Harris	Male	Pushed against post	Left	No			Yes	Recov.	Hematuria 10 days, Cystoscopic 23rd day
Harris	Male	Fell against rail		No			Yes	Recov.	Hematoma—Left hospital 2nd day
Harris	Female	Fell off fence	Right	No				Recov.	Fever and rigid pain right side
Harris	Male	Struck with steel bar	Right	No			Yes	Recov.	
Harris	Female	Struck by truck	Left	No			Yes	Recov.	
Harris	Male	Hit by baseball bat		Yes	Yes			Recov.	Crushed kidney
Harris	Female	Struck post coasting		No			Yes	Recov.	Hematoma
Harris	Male	Football injury		Yes	Yes		Yes	Recov.	Hematoma
Harris	Male	Fell off roof		Yes				Died	No kidney lacer.; marked hemothorax; arm, chest, back injury; shock
Harris	Female	Struck by auto	Left	No			Yes	Recov.	Pain left side
Harris	Male	Fell off roof	Left	No				Died	Autop.: Rupt. L. kidney, Died soon after admission
Horne	Male	Struck by knee, BB game	Right	Yes	Yes			Recov.	Much pain, shock. Kidney torn through middle
Stirling	Male	Fell in elevator shaft, landed on feet	Right	Yes	Yes		Yes	Recov.	Up. pole torn off; rest of kidney macerated; fr. wrists and 2 ribs
Stirling	Male	Struck by rock, L-side	Left	Yes		Yes	Yes	Recov.	Crawled home; pain L. side; shock; large tear lower pole; sutured; urine normal 4 weeks
Livermore	Male	Auto fell on him	Right	Yes	Yes		Yes	Recov.	Nausea; no vom.; pain and tender R. side; shock; mass rigid
Floyd & Pittman	Male	Injured sliding base		Yes		Yes	Yes	Recov.	Rupt. up. pole sutured; normal funct. in 6 mos.; pygram deform sup calyx
Floyd & Pittman	Male	Fell from tree	Left	Yes		Pack	Yes	Recov.	Transfusion; op. 48 hrs. after inj.; pack; pygram nor. 2 yrs. later
Floyd & Pittman	Male	Auto accident	Left	No			Yes	Recov.	Shock, pain, tender rigid left flank
Floyd & Pittman	Female	Fell down hill	Right	Yes		Pack	Yes	Recov.	Op. 4th day; tear midpost surface; pack; 3 mos. later pygram normal
Floyd & Pittman	Male	Fell off bike	Left	Yes	Yes			Recov.	Tender and rigid; temp. 103; nausea and vomiting
Floyd & Pittman	Male	Fell on his back	Left	No			Yes	Recov.	Dismissed in 8 days; normal 2 yrs. later
Hagner Adams,	Male	Fell 10 ft., struck girder	Left	No			Yes	Recov.	Urine cleared 5th day
Bancroft, Wheeler	Male	Struck by timber	Right	Yes		Yes	Yes	Recov.	Transfusion 3 liters; shock; lower pole severed; pack
Adams, Bancroft, Wheeler	Male	Fell two stories	Right	Yes		Pack	Yes	Recov.	Hemoperitoneum; WBC 24,000; transfus. 250 cc.; 1 yr. later pygram and funct. normal
LeComte	Male	Auto accident	Left	Yes		Yes	Yes	Recov.	Lone kid. rupt. into pelvis; tube for drainage
Summary	8 M 20 F 5 F	Falls—11 Auto Accidents—4 Games—6	R—8 L—11	No—11 Yes—14	6 All Rec.	All Recov.	H—19 6 Not Stated	Recovered without operation—10 Recovered with operation—13 Died—2 (1 op., 1 Not)	

with comparatively mild injury to the kidney were complicated by shocking and destructive injuries to other parts of the body.

One interesting and instructive case in this series is detailed here:

Male, age 17, admitted in September, 1932. He received a blow on the abdomen while playing football. He was unconscious and remained so for a few minutes. He then arose and

felt extremely weak but walked home with support of two team mates. He had abdominal pain which was not severe. During the evening he vomited. During the night he was quite comfortable.

Next day the urine was extremely bloody and remained so until admission to the hospital. From this on he had pain. He had no appetite but took fluids freely. Three enemas returned clear. No blood was passed by bowel. On the fifth day, severe, crampy, colicky pain occurred which caused him to double up and he vomited green material. Urine had been

dark in color for a few days. He was admitted with a blood-pressure of 130/78. No mass was felt; no fluid wave was elicited. Marked tenderness was present over the whole abdomen, particularly the right upper quadrant; some rigidity of upper right rectus muscle and some rebound tenderness was present. Some tenderness to pressure in right kidney area was observed and slight fullness in right flank. Urine: cloudy amber, acid, no sugar, albumen: 2 plus; White blood cells 3—5, Red blood cells 30—40 per HPF. Blood: hemoglobin 77, R.B.C. 3,910,000; W.B.C. 17,200, pmn's 90 per cent, lymphocytes 10 per cent. On the tenth day he seemed to be doing nicely. There were no complaints; no tenderness. On the twelfth day he had a severe attack of pain followed by urination of 1000 cc. of bloody fluid. Pulse was 100, weak and thready. B.P. 86/58. Patient went into shock. Intravenous medication was followed by improvement. B.P. then read 160/90 and the pulse was 80. Vomiting then began with bile stained vomitus. Nasal suction was then started. B.P. fell to 90/50. Saline (200 cc.) given and this was followed by a transfusion of 700 cc. citrated blood. On the thirteenth day: R.B.C. 2,280,000; hemoglobin 48 per cent; urine continued to be bloody. At noon operation was performed. A large right-sided perinephritic hematoma was present; considerable hemorrhage was encountered. Five hundred cc. of whole blood was given before the operation and 1500 cc. of citrated blood along with 1000 cc. acacia and 500 cc. normal saline solution given during the operation. He left the table in fairly good condition. The blood pressure was 100/60 at noon and in thirty minutes dropped to 70/50. Intravenous medication and other measures at this time brought no favorable response and the patient died on the thirteenth day.

At autopsy the peritoneum for the most part was smooth and glistening. There was in the lower abdomen about 200 cc. of old blood and some evidence of a fresh hemorrhage of about 100 to 200 cc. The lower border of the omentum was covered with old blood. There was no evidence of gross hemorrhage into the abdominal cavity, however. There was a small rent in the peritoneum over the right kidney which had been sutured. The lower two-thirds of the right kidney had been removed at operation.

From a series of 25 cases collected from the literature (Fig. 2), I find 20 (80 per cent) were males; 8 were

children. Ruptured kidney resulted from falls in 11 and from auto accidents in but 4 instances. Games or sports were involved in 6 instances. Hematuria occurred in 19 of the 25; in 6 cases it was not mentioned. Of 14 patients operated upon, 13 recovered. Ten patients recovered without operation. Two patients died—one operated upon and one not.

SUMMARY

Eighty-two per cent of cases included in this report were men. Prompt exploration as soon as the patient is in good condition for operation and the diagnosis is established, will result in conserving the integrity of the injured kidney. Late operation more often begets the necessity for nephrectomy. Obesity introduces greater operative difficulties in efforts toward conservative repair.

Excretory pyelography is a great aid in diagnosis and frequently will reveal the extent and type of injury to the kidney and its pelvis.

Expectant treatment may, as the result of information obtained through excretory pyelograms, be reserved for those cases in which there is no X-ray evidence of extravasation, even though there is clinical evidence of gross hemorrhage and shock.

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Traumatic Rupture of the Normal Spleen with Delayed Hemorrhage*

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SPLENECTOMY for traumatic rupture of the normal spleen was first successfully performed by Riegues¹ of Breslau in 1893. Other procedures such as suture, tamponade, marsupialization and packing have been tried, but splenectomy is today the standard procedure.

Traumatic rupture of the spleen is a major abdominal catastrophe which may produce death so rapidly as to cause a mistaken diagnosis such as pulmonary embolism or coronary occlusion. The condition is so serious that there is some question whether a patient with a ruptured spleen ever recovers spontaneously. Various writers have placed the mortality of the unoperated cases of traumatic rupture of the spleen at from 90 to 95 per cent. Unless the small percentage of cases diagnosed as ruptured spleen with spontaneous recovery are followed to autopsy it is difficult to prove that they may be properly regarded as having had ruptured spleens. Hamilton-Bailey² quotes Turnbull of London as never having seen at necropsy a spleen containing the scar of an old injury. James S. McCartney³ recently reviewed 25,000 autopsy records performed by the University of Minnesota Department of Pathology from 1920 through 1937 and found no instances of healed splenic hematomas. E. T. Bell⁴ says that he recalls no instances of autopsy findings in the spleen indicating spontaneous recovery from a traumatic rupture of the spleen. It would therefore appear that splenectomy is the only treatment to be considered when the normal spleen is ruptured.

Traumatic ruptures of the normal spleen may be divided into four groups: (1) Patients who rapidly succumb and never rally. (2) Patients who suffer initial shock with recovery from the shock and present signs of ruptured spleen. (3) Patients who present delayed signs of hemorrhage several hours or days following the initial injury. (4) Patients who are diagnosed as having ruptured spleens but recover spontaneously.

About 75 per cent of the cases seem to occur in group two and nearly twenty-five per cent occur in group one. The patients with delayed hemorrhage are comparatively rare. For practical purposes it may be best to deny that there are any cases of traumatic rupture of the spleen which recover spontaneously. Forty-five cases of traumatic rupture of the spleen with delayed hemorrhage were collected from the literature by McIndoe⁵ of London and to this list he added his own case which was reported in 1932. In a review of the literature since then I have been able to find an additional twelve cases. Because of the rarity of these cases in the literature and the importance of prompt and accurate treatment of these patients I wish to present the following case report:

*Read at the sixteenth annual meeting of the Great Northern Railway Surgeons' Association, Glacier Park, Montana, June 30 and July 1, 1939.

The patient was a school boy, age 8 years and 9 months. He was admitted to the Asbury Hospital in Minneapolis, on Friday, February 24, 1939, one week after injury.

Complaints: Pain in upper left quadrant of the abdomen, weakness, vomiting, fever and anemia.

Present Illness: Friday, February 17, 1939, at 4:30 P. M. he was standing with his father watching a high school hockey game. He was standing at one end of the hockey rink about 15 feet to the right of the goal. A player shot a puck at the goal and it went over the goal. The puck traveled about 35 feet and struck the patient in the upper abdomen on the left side. The boy was dressed for the outdoors and wore woolen underwear, a shirt, a sweater and a corduroy jacket at the region where he was hit. When the puck struck him he immediately complained of pain and doubled up and grabbed his left side. He sank down but did not fall to the ground, and his father noticed that he immediately became pale. His father said "he seemed as though he had had his wind knocked out of him." The patient walked about 30 or 40 feet bent over toward the left. He told his father he wanted to go home and he said he wanted to be carried because he didn't think he could walk. His father carried him home, and he was placed in bed. He vomited several times beginning about 15 minutes after the arrival at his home.

He was unable to sleep well and was very restless all Friday night. He complained of his stomach feeling hard. He stayed in bed on Saturday morning, but he felt better Saturday afternoon and walked seven blocks and remained up until evening.

On Sunday he felt better and stronger and got up and ate breakfast. He hurried to Sunday school because he was late and with his parents he went out for dinner with friends at 2 P. M. He said that he had soreness in the left upper abdomen which was less on Sunday than on Saturday, but he walked slightly stooped over. The soreness was less marked on Monday and Tuesday. He went to school on Monday. He went to school on Tuesday. On Monday afternoon he accompanied his mother to the doctor's office where he was seen incidentally by the doctor who took his hemoglobin and found it to be 74 per cent. He took his meals well on Monday.

On Tuesday he felt well until 3:50 P. M. when he was getting his clothes on to leave school. At that time he had more pain in the left side of the abdomen and became very weak and vomited. He was brought home on a sled by his schoolmates. He was very pale. His mother placed him in bed and a hot pack was placed on his abdomen after his mother had telephoned his family physician. Tuesday night he was very restless all night, and the packs were changed to cold packs. He complained of pain in the upper left quadrant. On Wednesday the parents noticed that he seemed to be getting weaker, and his physician saw him at his residence Wednesday morning. The cold packs were continued and he stayed in bed Wednesday and Thursday. His temperature was 99.2 degrees. He preferred to lie on his right side because he had severe pain when he would lie on his left side or his back.

From Tuesday evening on he complained at times of pain in the left shoulder (Kehr's sign). Wednesday night he was very restless and complained of pain in the upper left quadrant and left shoulder. On Thursday he stayed in bed and continued to complain. Thursday night his temperature rose to 101 degrees. Late Thursday evening his physician found his hemoglobin to have dropped to 40 per cent, and his trouble was diagnosed as a rupture of the spleen with recurrent massive hemorrhage. On Friday at 3 A. M., six and one-half days after injury, he was placed in an automobile and was brought 150 miles to Minneapolis, arriving at the hospital at 8 A. M.

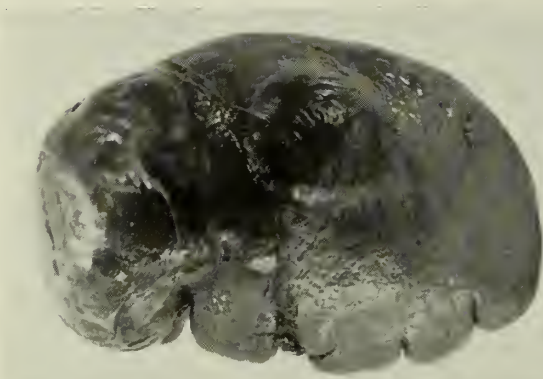


Fig. 1. Diaphragmatic surface of the spleen showing the laceration beginning on the anterior margin at the junction of the upper and middle thirds and extending posteriorly nearly to the posterior margin. A large subcapsular hematoma is shown over the middle of the spleen and a smaller one is seen on the surface of the upper third of the spleen.

There were no signs of ecchymosis or other discoloration in the region of the injury at any time.

There was no evidence of blood in the vomitus at any time. Bowels moved normally Saturday and Sunday, and there was nothing abnormal noted otherwise. He was allowed water only by mouth from Wednesday on. There were never any external signs of injury noted. The abdominal soreness was not as marked on Monday and Tuesday. There was no blood seen in the stools at any time.

Past History: He had chicken pox at the age of 5. He has had two colds in the past winter, one in December and the second one in February. He lost one week of school in February. His tonsils were removed at the age of 2½ years. He had bronchopneumonia in August 1938 at the age of 8 years and was sick for two weeks. Past history is otherwise negative.

Physical Examination: His temperature was 101.8 degrees, pulse 124 and respirations 20. He was very pale; the lips were swollen and cracked, and he complained of pain in the left upper abdominal quadrant. He preferred to lie on his right side. He was a well developed, well nourished boy of average size for his age. The examination of the head, neck, heart and lungs was essentially negative. The blood pressure was 106/74. The abdomen was slightly distended. There was definite left upper quadrant tenderness and rigidity. There was definite shifting dullness in both flanks with definite increase in the area of splenic dullness (Ballance's sign). The physical examination was otherwise normal.

The urine examination was normal. The blood examination on admission was as follows: hemoglobin: 52 per cent, red blood cells 2,890,000, white blood cells: 11,200, PMNa 61 per cent, lymphocytes: 36 per cent. There was moderate anisocytosis and poikilocytosis and an occasional nucleated red blood cell. The bleeding time was 2 minutes, and the coagulation time was 1 minute and 30 seconds.

The patient had traveled 160 miles in an automobile and it was considered advisable to give him a few hours of rest. An ice bag was placed over the splenic region. Donors for blood transfusion were grouped.

X-ray examination was made of the chest and abdomen, and the report by Dr. Malcolm B. Hanson is as follows: Films were made of the chest. These show a slight elevation of the left diaphragm shadow. No evidence of fluid in the chest. There is an increase in the bronchovascular markings throughout both lungs. No evidence of pulmonary tuberculosis. No evidence of fractured rib. Films were made of the abdomen. These show increased density in the left upper quadrant with a slight elevation of the left diaphragm and a slight displacement of the stomach toward the right side. Both psoas muscles are clearly



Fig. 2. Antero-internal surface of the spleen showing the laceration extending from the anterior margin to the hilus of the spleen.

visualized. *Conclusions:* The added density in the upper left quadrant, together with the slight elevation of the left diaphragm and displacement of the stomach, is compatible with that seen with a ruptured spleen. The lungs are negative with the exception of a slight increase in the bronchovascular markings.

After a few hours of rest in the hospital, the patient's temperature dropped to 101.4 degrees, and the pulse rate dropped to 120. The blood examination was repeated and the hemoglobin was 42 and the red blood cells were 2,600,000. A transfusion of 300 cc. of citrated blood was followed by 400 cc. of normal saline. The patient was operated upon Friday, February 24, at 8:30 P. M. as follows under nitrous oxide and ether anesthesia:

Upper left rectus incision 5 inches long was made. When the peritoneum was exposed dark blood could be seen through the peritoneum between the various loops of bowel. On opening the peritoneum dark blood gushed from the incision. The spleen was immediately located, found to be about twice normal size and a lacerated tear in the capsule could be felt in the region of the junction of the upper and middle thirds of the spleen. Figures 1 and 2. A splenectomy was performed and the wound was closed in tiers. No effort was made to remove the blood from the abdomen other than that which escaped during the operation. There was considerable blood in the flanks and particularly in the upper left quadrant. The blood in the region of the spleen was slightly lighter in color than that in the rest of the abdomen. Fine silk was used throughout the operation for ligatures and sutures, and the patient's condition was good at the end of the operation.

The patient was given 300 cc. of blood by the citrate method at 10 P. M. this same date.

The convalescence was uneventful. The temperature reached normal on the third day after operation and the pulse rate became normal on the sixth day. He had surprisingly little distress in the abdomen postoperatively which is of interest in view of the large amount of blood left in the abdominal cavity.

The hemoglobin rose steadily and on March 8, 1939, the hemoglobin was 72. The wound was healed without complication and the patient was discharged on the twelfth day after operation.

The normal spleen lies in a sheltered position behind the costal margin surrounded by elastic viscera and is freely movable and as a result is comparatively rarely damaged. It is less frequently injured than the kidney, the ratio being about one to four. Splenic injuries are much more common in men than in women. Common

causes are vehicle accidents, falls on projecting objects, kicks, squeezes and sharp blows over the splenic region.

When the spleen is injured, however, the hemorrhage which may occur is comparable to that of ruptured ectopic pregnancy in that the blood escapes freely into the abdominal cavity. The arterial blood supply of the spleen, however, is usually greater than that of an ectopic pregnancy. Hemorrhage from an injured spleen differs from that of an injured kidney where the bleeding does not occur into a free cavity. It differs from ruptures of the liver in which the blood supply is mainly venous and under low pressure. It is obvious therefore that there is great danger in conservative treatment and delay with hope for spontaneous recovery when the normal spleen has been ruptured.

Approximately one-fourth of the cases of traumatic rupture of the normal spleen rapidly succumb and never rally. The surgeon has no chance to treat these patients. The remaining three-fourths suffer an initial shock often with loss of consciousness from which they recover. There is local tenderness over the splenic area and over half of the cases show rigidity in the left upper abdominal quadrant. Signs of internal hemorrhage are not constant findings at the beginning. A half hour pulse record should be made. Lowered hemoglobin estimations and diminished red blood cell counts may not occur for some time and pallor may be a late symptom. Pain in the left shoulder, Kehr's sign, is a referred pain due to irritation of the diaphragm in the splenic region and transmitted by the left phrenic nerve and is a frequent occurrence. Ballance's sign, fixed dullness in the splenic region due to large blood clots with shifting dullness in the right flank is usually a later symptom occurring after sufficient time has elapsed to permit the accumulation of several blood clots. The signs are usually only those of free fluid in the abdomen.

The diagnostic value of the X-ray has not been emphasized. In McIndoe's review of forty-six cases, the X-ray was only used in his own case. As the profession becomes more watchful for ruptured spleens with delayed hemorrhage, more X-ray studies may be made. The X-ray findings of increased density in the left upper quadrant with elevation of the left diaphragm and displacement of the stomach to the right due to accumulation of blood clots about the splenic area, combined with evidence of free fluid between the loops of intestine, should be of assistance in diagnosing the cases with delayed and recurrent hemorrhage from the spleen.

The pathological condition produced may consist of a primary intracapsular hematoma with subcapsular hemorrhage followed by attempts at healing over a period of several days. Repeated slow hemorrhages increase the intracapsular tension to a point where a slight rise in intra-abdominal pressure causes a secondary rupture of the capsule.

After the capsule ruptures, the patient may go into a state of shock and with the fall in blood pressure the bleeding may cease and a clot of more or less firmness may form and may become organized. With the sub-

sequent rise of blood pressure and an increase of intra-abdominal pressure, the clot becomes dislodged and bleeding recurs. There is thus seen to be a delicate balance between the vis a tergo of the extravasating blood and the hemostatic forces opposed to it.

The latent period after primary injury for the delayed hemorrhage cases has been arbitrarily placed at forty-eight hours.

In a review of the reported cases of traumatic rupture of the normal spleen with delayed hemorrhage, about 80 per cent of the patients were men. The youngest patient reported was eight years. In 50 per cent of the cases, secondary rupture occurred in from two to six days. In 25 per cent of the cases, secondary rupture occurred in from seven to eleven days. One case required more than thirty days. The longest case reported was six months.

When a patient is injured in the region of the spleen and there is a fracture of the lower left ribs, an injury to the spleen may be suspected and if such an injury is suspected the patient should be kept at rest and under observation for fourteen days. The treatment of a ruptured spleen is splenectomy and the technic of this procedure is rather well standardized.

Mortality in the operated cases is variously given as from 30 to 50 per cent. In the unoperated cases mortality is given as 90 to 95 per cent.

CONCLUSIONS

Traumatic rupture of the normal spleen with delayed hemorrhage presents a well-defined clinical syndrome. Such injuries are undoubtedly of much greater frequency than is revealed by a review of the literature. The condition should be kept in mind in all injuries in the splenic area.

Suspected injuries of the spleen should be kept under observation for at least fourteen days.

Spontaneous healing and recovery undoubtedly does occasionally occur, but a consideration of the physiological and pathological conditions existing forces us to consider conservative measures as extremely hazardous.

The roentgenological findings of increased density in the left upper quadrant of the abdomen, elevation of the left diaphragm, displacement of the stomach toward the right side with evidence of free fluid between the loops of intestine present an additional useful diagnostic sign which was illustrated in the case reported herein.

The treatment of ruptured spleen is splenectomy.

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Lordosis Associated with Tetanus*

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COMPARED with the major plagues of man, lockjaw has always been a rare disease. It is on account of the characteristic and fatal spasms that it early attracted attention. The spasms are tonic in nature, with acute and painful exacerbations. They usually begin in the muscles of the jaw and neck and in severe cases spread to the voluntary muscles of the body and the extremities.

In the past, epidemics of tetanus in hospitals and wars were rather common. The conditions of trench warfare in the World War favored wound complications and included a frightful amount of tetanus until antitoxin was used as a routine prophylactic in all wounds. Not only in the army is the importance of the prophylaxis of tetanus emphasized, but also in industrial work, and especially in railroad surgery is its great significance stressed. Not to give tetanus antitoxin in cases of gunshot wound during the World War could have been considered a courtmartial offense.

Tetanus may be regarded almost solely as a wound complication. The incubation period is from eight to ten days although in severe wounds associated with necrosis of tissue, this may be reduced to as low as three days. Wounds infected with bacteria, such as the gas bacillus, permit the tetanus spores to germinate, and seem to encourage the growth of the bacillus and the production of the toxin. In a recent case report of post-operative tetanus, the bacilli were recovered from the healed incision ten years following surgery. Klimko¹ reports 246 cases of tetanus with a mortality of 82.9 per cent in which the incubation period averaged five days. In another series of 201 cases, there was a mortality of 50.7 per cent and the incubation period was found to be about 11 to 14 days. In a smaller group of 30 cases, the incubation period was 15 to 19 days, and the mortality was 26.7 per cent. It will be observed from these figures that a short incubation period leads to an unfavorable prognosis.

The symptoms are due to a soluble toxin formed in the wound which later acts on the motor cells in the brain and spinal cord. It is generally thought that the toxin reaches the motor cells only through the motor nerve fibers. Abel² and associates, however, have presented evidence which tends to show that the toxin may reach the motor cells via the blood stream.

The early symptoms are usually rigidity of the neck and facial muscles, spastic smile, and difficulty in protruding the tongue. Painful cramps or spasmodic twitching in the vicinity of the wound, increase in reflexes, difficulty in micturition are also observed. The muscular stiffness increases until a slight external stimulus will produce a tetanic spasm. The convulsions begin with stiffness of the neck followed by trismus and then risus

sardonicus and opisthotonus. Difficulty in breathing and swallowing produces cyanosis. Localized tetanus is frequently observed and is thought to precede generalized tetanus in about 10 per cent of cases.

The spores of tetanus are not affected by gastric digestion, and in the intestines of certain animals, find ideal anaerobic conditions, food supply, and temperature for growth and development. Tetanus spores are present to a variable extent in the intestines of man. The normal habitat of tetanus bacilli is in the intestinal tract of animals. The spores are frequently found in manure, cultivated or garden soil. Gilles of Johns Hopkins found eleven strains of the bacillus in six samples of dust in Baltimore. In making a diagnosis of tetanus, one must consider and rule out such conditions as strychnin poisoning, tetany due to calcium deficiency, rabies, hysteria, and meningitis. Tetanus sometimes occurs when no wound can be located and it is then called "idiopathic tetanus." In the prophylaxis of tetanus one must consider first the local treatment of the wound and then the specific treatment, such as the giving of antitoxin. Limiting the use of firecrackers on the Fourth of July has been an aid in the prevention of this disease. The local treatment of the wound consists of debridement, cleansing, and the removal of foreign bodies. Punctured and lacerated wounds should be freely opened and cleansed. Oxygenation of the wound is frequently advisable. Cauterizing the wound usually leaves an eschar which tends to seal in the bacilli and thus may hasten the development of the disease. In performing the debridement the use of two knives has been advised; one for the surface, and the other for the deeper tissues.

Tetanus antitoxin is a specific and trustworthy preventive. The antitoxin should be administered before the advent of symptoms, for after the toxin has combined with the motor nerve cells in the central nervous system, it is displaced or neutralized with difficulty, if at all. As with other toxins, a small amount given early is better than a large amount given later. A prophylactic dose of tetanus antitoxin is 1500 units. If the wound contains necrotic tissue or a foreign body, the injection should be repeated every seven days until the wound is clean or as long as the hazard of tetanus exists. A history of allergy such as hayfever and asthma should be investigated and a skin test should be done prior to the giving of the antitoxin. If the skin test is positive, the antitoxin should be administered in divided doses during the course of an hour. Occasionally an initial dose of 3000 units may be necessary.

In producing immunity one may use an alum toxoid which rarely causes sensitization effects and which will give a complete and permanent immunity. In the British army two doses of the alum toxoid are given at an interval of three months with a third injection being given just prior to the entering of war service. Its effi-

*Read at the sixteenth annual meeting of the Great Northern Railway Surgeons' Association, Glacier Park, Montana, June 30 and July 1, 1939.

ciency is increased if a bacterial serum is administered simultaneously with the toxoid. Graulier of the French army suggests that antitetanic vaccination be made compulsory.

Vener³ of the Los Angeles County Hospital reported 44 cases of tetanus with a mortality of 13.6 per cent and attributed this low mortality to their form of treatment. The important points in the type of management used by Vener are as follows: (1) The treatment is prompt and most active. (2) After a diagnosis is made, 10 to 30 grains of chloral hydrate are administered, orally if possible. (3) Local treatment of the wound is then carried out as outlined above. (4) Two thousand units of antitetanic serum is injected about the wound, and if the injury is located in a limb, 4000 units more are injected into the muscles proximally to the site of injury. One hour later 20,000 units are given intraspinally after drainage of the spinal fluid. Then in seven hours, 40,000 units diluted in 300 cc. of normal saline are given intravenously. One hour should be allowed for the administration of this solution with adrenalin being given before and after the injection. In another three hours 15 grains of hexamethylenamin (10 cc. of a 10 per cent solution) are given intravenously. One hour later, if the rectal temperature is below 102 degrees, 40,000 more units are given by the intravenous route. If a serum reaction should occur, this last dose is omitted. Eight hours after the last injection of 40,000 units, an equal amount is given intramuscularly about the wound. In all, 200,000 units are given and each intramuscular injection is followed in eight hours time by an intravenous injection of hexamethylenamin. The full dose of 200,000 units is administered regardless of age and sex. The usual measures for oral hygiene, fluids, changes of position, dark room care, and serum sickness are observed.

In reviewing the literature, one observes that to relax the muscular rigidity is the chief factor in the management of these cases. One may use, besides chloral hydrate, such agents as morphine, magnesium sulfate, and avertin. Avertin is used extensively by Gage and DeBakey,⁴ and Cole.⁵ The last author reports a series of ten cases which he treated with avertin with very excellent results. There is still considerable discussion whether or not subarachnoid injections should be done. It is thought by some to be an irrational procedure as the toxin is fixed in the brain tissue which could not be reached with antitoxin through the spinal fluid. For serum to be successful, it must have a rapid action and must be carried to the nerve centers rapidly. According to some, the tetanus toxin is never found in the spinal fluid itself.

REPORT OF CASE

L. P., school girl of 13, was admitted to Sacred Heart Hospital on October 12, 1938. She presented the appearance of being in a convulsive state with marked rigidity of the muscles of the neck, abdomen and back. The back was extended in the position of opisthotonos. The masseter muscles were rigid, allowing the jaw to be only partially opened. Slight external stimulation immediately produced a tetanic spasm. The pulse was 132, temperature rectally 101, and respiration 44.

From the parents we obtained a history of injury of the right foot which was produced by the child's stepping on a bone, which had been carried about by a dog. The wound had received no medical attention. A chiropractor who first saw the patient made a diagnosis of neuritis and advised spinal adjustments which seemed to aggravate the condition. Only through the insistence of neighbors was the child finally brought to the hospital.

An initial dose of 20,000 units of antitetanic serum was immediately administered intravenously. Sodium amytal was given rectally. The wound was thoroughly cleaned after the patient had been anesthetized with gas and ether. Twenty thousand units more of the antitoxin was then injected intraspinally. That evening another dose of 20,000 units was given intravenously. The general condition of the girl did not improve very rapidly, and it was thought that she would probably succumb to the infection. On the second day, she received 60,000 units of antitoxin which was administered intravenously. Sodium amytal was used extensively to quiet the patient and to prevent the recurring spasms. During the next three days the patient received 80,000 units of tetanus antitoxin at which time definite improvement in the general condition could be noticed. She received only one injection of serum intraspinally. She was discharged from the hospital two weeks after admission and seemed to be in generally good health.

As the child lived in the country, she was not observed by me during the next three months. During January 1939 she returned and presented a marked deformity of the lower spine and chest. When discharged from the hospital, she showed no evidence of spinal deformity. Previous to her illness, she engaged in such sports as swimming and riding and apparently was very active.

An X-ray examination of the spine indicated a marked kyphoses in the midthoracic vertebrae with definite gibbus formation at the level of the sixth thoracic vertebra. The body of the fourth thoracic vertebra was compressed to about two-thirds the diameter of the third. There was some increase in density throughout this body. The body of the fifth thoracic vertebra was compressed to a slightly greater degree than the body of the fourth; the density in the upper portion was definitely increased. A marked compression had taken place in the body of the sixth thoracic vertebra with wedge formation anteriorly and reduction of the anterior dimension to approximately one-fifth the dimension of the eighth and ninth.

The seventh thoracic vertebra was compressed in a similar degree to that of the fifth, and similar increase in density was present throughout the body. The eighth thoracic vertebra was compressed to approximately two-fifths of the original dimension with porosis throughout the upper one-third. The articular surface was somewhat irregular in this body. The joint spaces have been largely preserved throughout the spine. The epiphyses were normal in character.

The patient is now in good physical condition except for the spinal deformity. She has been advised to put herself in the care of an orthopedist.

DISCUSSION

In 1907 Lehndorff reported the first case of spinal deformity following tetanus. In young children a spinal deformity following tetanus is frequently transient and will be found only through good X-rays. In adults the condition may be overlooked because of its infrequency and because it does not always appear immediately upon recovery from the disease. In fatal cases of tetanus, the spine is usually not examined and thus deformities are overlooked.

It is frequently said that tetanus causes deformity only in rachitic individuals, but according to Roberg,⁶ this is not true. In younger people the deformity is noticed during the attack or immediately following. In older children the curvature may occur six weeks to

three years after recovery. In adults if the deformity occurs early, there is a greater chance of a fracture being present. According to Roberg, the nature of the changes in the vertebral bodies consists mostly of flattening and wedging of the affected vertebrae with a particular thickening and indentation of the superior and inferior surfaces in the younger patients. Various authors have spoken of the effect of tetanus antitoxin on the vertebral bodies and of the bacilli on the vertebrae. Disturbances in blood calcium and potassium levels may be a factor. In children there is probably a weakness of the vertebrae which allows for deformity to occur. Roberg believes there is an acceleration of endochondral ossification during the periods of most active body growth, causing ossification in the metaphysis of the vertebral bodies to lag behind a predominating proliferation of columnar cartilage.

Polatin⁷ recently reported several cases of vertebral fractures associated with convulsions due to the use of metrazol. The incidence of fracture was high and in most instances, the fractures were multiple. It is probable that these fractures were produced by anterior flexion of the spine which occurs during the convulsion induced by metrazol.

SUMMARY

Due to lack of prophylaxis, tetanus is more prevalent than thought to be by the individual practitioner, probably due to misjudging the serious consequences of neglecting a rather trifling injury. The usual dose of 1500 units does not always protect, and one should increase the amount as conditions indicate. Deep wounds should be thoroughly cleansed and watched for the development of any local complicating factors. The type of management used by Vener can be strongly advised for every case of definite tetanus. A case has been reported of lordosis associated with tetanus.

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Osteomyelitis*

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IN spite of the pioneer work done by Starr and Choyce in an attempt to educate the general practitioner to consider its possibility, acute osteomyelitis is still treated under the mistaken diagnosis of rheumatism or rheumatic fever. The most important point in diagnosis of osteomyelitis is to consider possibility of its existence.

Robertson stated in 1925, "This disease is to be found in its primary attack only up to age at which last epiphysis unites. It never occurs after the union of the epiphysis."

The skeletal infection is always secondary to a remote infection, the source of which is usually the integument or the mucous membrane of the upper respiratory regions. The most common infective agent is the staphylococcus aureus, staphylococcus albus, streptococcus albus and streptococcus pyogenes. The first skeletal manifestations of the disease are constantly localized in a single metaphysis of one of the long bones of the extremities. The primary bone involvement is not in the medullary cavity, the cortex, or main shaft of the growing bone. During the early acute stage the infection is limited to a single metaphysis. However, subsequent

to direct or hematogenous spread of the infection and in the subacute and chronic phases of the disease, the main shaft, medullary cavity and neighboring joint may be affected. During the acute stage, there is no reason for their surgical exposure. The surgical attack should be limited to the site of the infection near the metaphysis.

The clinical history, pathogenesis and fundamental principles of treatment may be explained by our knowledge of certain anatomic features of the bone and the joint systems.

A long bone is divided into segments: epiphysis, metaphysis and diaphysis. The metaphysis represents the bone most recently developed from the epiphyseal cartilage or disk and is therefore more vascular, delicate, more susceptible and less immune than the older bone of the shaft. The cortex of the middle of the shaft is more or less than ¼-inch thick while the cortex surrounding the metaphysis is much thinner and newer and at the epiphyseal disk is paper thin. This explains the ease with which an infection within the cancellous metaphysis may perforate into subperiosteal space and why the rupture is usually justa epiphyseal as emphasized by the late Dr. C. L. Starr.

Lexer, Kuliga and Turk in 1904 demonstrated the

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practically independent circulation of the epiphysis, the metaphysis and the cortex of the shaft. The metaphysis is richly supplied by the terminal branches of the nutrient artery. The epiphyseal circulation is separated from the vascular system of the metaphysis by a practically avascular barrier, the epiphyseal disk. The extraordinary rich capillary network of the metaphysis and epiphyseal region is gradually reduced with diminished physiological activity of bone production of the epiphyseal disk. This explains why acute hematogenous osteomyelitis is essentially a disease of childhood. The periosteum covers the shaft of a long developing bone and is firmly attached to the entire circumference of both proximal and distal epiphyseal disks.

The problem of joint involvement secondary to acute hematogenous osteomyelitis depends largely on the anatomic relationship between the joint capsule, the periosteum, the metaphysis and the epiphyseal disk. Certain metaphysis are intracapsular while others are entirely extracapsular. Surgeons must have a thorough knowledge of the anatomic relationship between metaphysis, epiphyseal disk, periosteum and joint capsule in many regions of the skeleton, since surgical drainage without joint infection should always be made through an extracapsular dissection.

CLINICAL PATHOLOGICAL FEATURES

The earliest phase of acute osteomyelitis is an acute hematogenous metaphysitis. The incidence of chronic osteomyelitis will be lessened when an attack is made on primary bone infection within the metaphysis before it perforates the metaphyseal cortex and involves either by direct or hematogenous spread the cortex and medullary cavity of the shaft of the bone or neighboring joint. The infection remains localized in the metaphysis or justa epiphyseal region for hours or days depending on the virulence of the invading organism and local and general resistance of the patient.

It is during this brief period that diagnosis is essential and metaphyseal drainage is imperative if one is to avoid a surgical catastrophe or chronic osteomyelitis with recurrent disability throughout the life of the patient.

The main issue in the treatment of the earliest phase of acute osteomyelitis is the necessity of adequate drainage of the affected metaphysis during the first twenty-four to forty-eight hours before the infection perforates the cortex of the metaphysis near the epiphyseal disk where it is paper thin and before it spreads beneath the periosteum. As first emphasized by Starr, the spread of the infection is by perforation through the extremely thin cortical wall of the metaphysis, then spreading beneath the periosteum along the shaft of the bone which it involves through the haversian system. During the earliest clinical phase the child is acutely ill and complains of constant severe pain in the region of the joint. Joint tenderness is one of the most important clinical observations. The adjacent joint is clinically normal and the chief sign is severe, unchangeable tenderness localized over the affected metaphysis. There are signs of intense toxemia, temperature is elevated and the pulse

is rapid. Leukocytosis is usually high; radiographic studies are negative.

PATHOGENESIS

The pathological changes are identical with those of soft tissues combating a pyogenic infection. The clinical manifestations are however different since the infection is confined within a bony structure which does not yield to pressure. The abscess usually makes its exit from the metaphysis near the epiphyseal disk where the cortex is paper thin.

A differential diagnosis must be made from acute rheumatism, gonorrheal joints and cellulitis.

TREATMENT

Treatment includes a conservative surgical program following the principles laid down by Starr. Adequate attention to the general state and dehydration are primary considerations. When infection is confined to the metaphysis, the physician has an opportunity to appreciably influence the prognosis.

Through a small incision, the affected metaphysis is explored, the cortex exposed, and several drill holes made into the cancellous bone. The wound is lightly packed with petroleum gauze, according to the Orr method, and covered with sterile dressings. A plaster cast is then applied. Physiological rest and adequate drainage are the two essentials. After the infection has perforated the cortex and spread periostically along the shaft or directly within the neighboring joint, there is a change in the clinical manifestations. It is during this critical period that the disease is usually recognized. At this time the local bone and joint infection should not be considered the major issues until measures have been taken to improve the general resistance of the patient.

Physiological salt solution with 5 per cent dextrose and blood transfusions may be indicated. The abscess should be drained but the shaft and medullary cavity should not be attacked with chisel and mallet. A drill hole a short distance on the diaphyseal side of the affected metaphysis is made if pus is found. Several drill holes should be made along the affected diaphysis.

The wound is treated by the Orr method, and packed with vaseline gauze. Physiological rest is attained by plaster of paris cast. Spread of infection, sequestrum formation and deformity will determine the subsequent surgical program.

Acute hematogenous osteomyelitis is difficult to cure even after the primary focus has been eliminated. After the wound has been healed for weeks, months or years, an abscess may develop which may require opening. In the hematogenous form one never knows when the last foci is eliminated. On the contrary, osteomyelitis secondary to amputations, empyema, felons, abscessed teeth, and bone plates, nearly always heals and stays healed. Serums, vaccines or medications of any kind are of very little value.

In all that has been written on this subject, little has been added to the classical works of the late Dr. Starr of the University of Toronto.

Eye Health of the College Student*

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New York City

COLLEGE administrators and faculty have long been interested in the vision of college students. Their concern is based on the belief that visual efficiency may be a factor in the college success of the student, and in his success in post-college life. In a measure, this basis operates today in such institutions as the U. S. Naval Academy where the chief purpose of the ophthalmic service is to select for further training those students free from eye defects that might handicap them in the Naval service.

On the other hand, the concern of the student health service with the vision problems of the college student is not founded on a desire to disqualify those with defective vision, but rather, in the hope that through eye health supervision, the student's chances for success may be increased, and his normal development be safeguarded through the early discovery of defects and subsequent ophthalmological supervision and care.

For two years the Eye Health Committee of the American Student Health Association has been studying the situation. The three national organizations of ophthalmology are watching the study with interest. All three organizations are represented on the Advisory Committee of Ophthalmologists which has been working closely and constantly with the Eye Health Committee. The reports of these representatives to the parent organizations will bring before organized ophthalmology the problems with which the two committees are concerned. It is the hope of both committees that a wider interest in the eye health problems of college students will pave the way for a unified attack on the problems.

The problems themselves are numerous. The ramifications of each are manifold. They reach into all phases of college life. The solutions are not easy, nor the correct approach always apparent. Any attack on a single problem demands an understanding of the whole situation. Contributions from many fields must be scrutinized and evaluated. Not only are ophthalmology and physiological optics involved, but general health, nutrition, illuminating engineering as well. Commercial propaganda with its tendency to utilize half-truths must be recognized and dealt with cautiously.

The task is not simple—but it is challenging and exceedingly worthwhile. Nowhere, probably, do the words of the old Greek philosopher hold more true, "The gods sell that for which man labors."

From a practical standpoint, the student health service faces some imperative questions:

Is there a significant loss of vision during the college career? If so, how great is the loss? How significant is it?

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†Secretary of the Eye Health Committee.

Boynton's study in the University of Minnesota indicates that there is a loss and suggests that the loss may be significant.¹

Reports from the U. S. Naval Academy show that the amount and character of the loss of vision during the college career is significant to that institution. With its plan for periodic ophthalmological examination of all students (began in 1937),² the institution should be able to assemble data that will throw light on the whole question.

A second question of interest to college health service is related to the causal factors in the loss of vision during the college career. Is the eye load of the average student an influence? How does his general health affect his ability to carry the eye load? What is the influence of the developmental stage of the student? What is the influence of the environment in which he works?

Presumptive evidence indicates that, in the breakdown of visual acuity during college life, all of these factors are important. The question is a challenging one, and many directors of student health would like to make some attack upon it. Few departments have the facilities or the staff to attempt it. Those who can make an attack on the problem have a responsibility which they should face. Here is a research problem which should have attention.

Another question of immediate interest to college health service is: How can the college safeguard the eye health of its students?

This question may be attacked without much preliminary study. It does not involve long waiting for laboratory results. Authentic facts are already available. Professional guidance by the Advisory Committee of Ophthalmologists is at hand. With carefully selected information, the problem resolves itself into one of engineering, guidance, and medical supervision. Most health service departments can equip themselves to handle the problems involved. For this reason, the Eye Health Committee began its activities with this question; and selected two points of attack.

The first attack was an attempt to reduce student strain and fatigue through improved study facilities. Since study facilities include the classroom, the library, and the dormitory study room, the attack was simplified by limiting the activities to those related specifically to the dormitory study room. Here coöperation of the college administration, the student himself, and the health service department could be expected to show results soon.

The committee activities involved a survey of a hundred dormitory study rooms; an analysis of the findings; the selection of acceptable standards for dormitory study facilities; the assembly of reliable information basic to

the standards and its presentation in a bulletin useful alike to student and faculty; and the formulation of specifications for an inexpensive study lamp that meets the requirements for eye health.

The bulletin on study facilities¹ presents the standards selected, the facts basic to them, and the specifications for the student lamp. Since this bulletin will be published soon and available to you, there is little need to repeat the contents here. The standards for study facilities and the specifications for the study lamp have been distributed today. A lamp constructed according to the specifications is on exhibition in Parlor A of this hotel. You are invited to inspect it, and to note the demonstration study set-up of its use in a two-student room.

The bulletin on study facilities will be distributed to college administrators through their national organization, and an attempt will be made to secure their support of this phase of your program. The Eye Health Committee and the Advisory Committee of Ophthalmologists invite you to an active participation in a program aimed at the improvement of college study facilities.

The second point of attack by the committees was the early selection of students needing ophthalmological care. This phase of the student health service has lagged behind many of the other phases.

The eye health service in college today is probably better than that revealed in the 1937 bulletin from the U. S. Office of Education.² Of the questionnaires sent to all institutions of higher education, one-half were answered. Of those institutions replying, ten per cent reported some provision for refraction; but in many instances the provision was through a cooperative relationship with a local eye man. A few colleges do offer ophthalmological service, usually on a fee basis. The majority do not appear to go beyond the routine test for distant visual acuity. For the most part directors of student health service do not seem proud of the eye work in the health service. Complaints frequently voiced relate to inadequacy of staff, limited equipment, and the ineffectiveness of the routine tests.

To meet this situation the two committees undertook the selection of a series of simple tests which any college physician might use to screen out students in need of ophthalmic care. These tests are for screening purposes only. They should under no circumstances be considered as an ophthalmological examination.

The series of tests together with a statement of conditions under which they should be made, and directions for making them have been offered you in the mimeographed bulletin, *Vision Appraisal*. This bulletin and the *record card* were sent you some time ago in the hope that you would be ready today with criticisms and suggestions for your committee.

Since it is desirable from time to time to review results, some provision should be made to secure comparable data. Your committees had this in mind in planning the *record card*, and in determining the conditions under

which the tests should be made. The conditions were not selected at random, but each has the support of research, ophthalmological practice, or a strong favorable ophthalmological opinion. The documentation indicates the source of the item or its support.

Equipment for testing visual acuity has long been a problem in the health service department of the colleges, as it has been in the public schools of the country. The test chart holders within the budget allowance of the department, tended to have faults, such as: uneven distribution of illumination on the chart, too great intensity, too low an intensity, a bright light within the field of view of the subject, or sharp contrasts in light and shade.

The Advisory Committee of Ophthalmologists accepted the challenge and have prepared specifications for a lighted chart holder which should meet the requirements for chart illumination as set forth in the "Standards" in *Vision Appraisal*. These specifications will shortly be in the hands of the manufacturers, and the holders should be available by late summer or fall. It is estimated that the holder should cost no more than ten dollars.³

Distant visual acuity is not the only index of visual efficiency. Symptoms and complaints of the student frequently indicate a disturbance of efficiency in near vision. The obvious eye conditions of the student also constitute evidence that should be taken into account. Reports indicate that a muscular imbalance not always apparent on inspection may disturb the visual function. The Eye Health Committee and the Advisory Committee of Ophthalmologists hope that you will see fit to equip yourself with the essential skills needed to use the simple tests included in the bulletin. Dr. LeGrand H. Hardy, a member of the Advisory Committee representing the American Academy of Ophthalmology is with us today and has consented to demonstrate the tests, consider their value to you, and answer your questions regarding their use.

To re-state the problem: The one and a half million college students constitute an important eye health problem to the college student health service. Two points of attack open to the health service are: (1) the improvement of college study facilities; and (2) the early discovery of students in need of ophthalmological attention. In the latter attack there is also an opportunity for compiling data, the analysis of which may throw further light on the eye health problems of students.

Your Eye Health Committee in cooperation with the Advisory Committee of Ophthalmologists have studied the problems involved for two years. As tangible results of their efforts they present, for your consideration and use, the following materials and equipment:

1. Acceptable standards for study facilities in college dormitories.
2. A bulletin of information, *The College Student and the Dormitory Study Facilities*.
3. Specifications for a Study Lamp for a two-student dormitory room. A lamp constructed according to the

specifications is here for your consideration. The cost to colleges is \$5.75, f. o. b. New York.

4. *Vision Appraisal*, acceptable standards for vision appraisal of college students, (mimeographed copies distributed to all members of the association).

5. A record card to use in the eye inspection and vision testing (also distributed to you).

6. Specifications for a lighted chart holder for vision tests, to be distributed to manufacturers. The cost is to be not more than \$10.00.

Your discriminating use and evaluation of the material

and equipment herein presented will be the best possible evidence of your approval of the committee efforts.

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5. The specifications have been approved and are in the hands of the manufacturers. Inquiries should be addressed to LeGrand H. Hardy, M.D., 30 East 40th Street, New York City.

American Student Health Association Committee on Personnel Training*

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(Preliminary First Report)

Your Committee wishes to submit a first report on the question of Personnel Training for student health work.

1. *General Qualifications*. Your Committee sees no better statement of the general qualifications than those adopted by the First and Second National Conferences on College Hygiene.
2. *Special Academic Training*. In addition to the training for the M.D. or the R.N., it is suggested that persons who wish to train for student health work should take additional courses comparable to that included in the regulations for the Masters Degree in Public Health as offered in a number of educational institutions. The following special courses are suggested:
 - a. Vital statistics and statistical methods.
 - b. Public Health Administration.
 - c. School Hygiene.
 - d. Sanitation.
 - e. Epidemiology.
 - f. Methods of Health Education.
 - g. Sociology.
 - h. Industrial Hygiene.
 - i. Mental Hygiene.
 - j. Hospital Administration.

k. Various aspects of providing medical care to the public on a basis of group participation.

3. *Training in Service*. It is suggested that the trainee to become a Director or Supervising Nurse secure experience by actual work in a student health department for a period of from one to four years. During this time experience and responsibility will be graduated to cover the entire program of college health work. The last year of such training should cover very largely the responsibilities of the Director or Supervising Nurse of the department.

Where the staff is large enough it is suggested that this course of training be four years and that during this period, the trainee assume entire responsibility for the health supervision of the members of a class, carrying them from their freshmen year through to the end of their senior year.

4. *Exchange Experience*. It is advised that arrangements be made during the training period for the exchange of personnel between departments of other universities.

Respectfully submitted,

H. L. MARSHALL, M.D.

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W. E. FORSYTHE, M.D., *Chairman*

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Dr. N. J. Nessa, *Pres.*
Dr. H. I. Down, *Secy.*
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MINNEAPOLIS, MINN., DECEMBER, 1939

**The Board of Editors and Publishers
of the Journal-Lancet wish their
readers a very Merry Christmas
and a Happy New Year**

THE SURGERY OF TRAUMA

The need for further study in the surgery of trauma has been in the minds of many surgeons for years. Recently the American Association For the Surgery of Trauma was organized regardless of the complaints that there are already too many medical societies. A review of the programs of four of our leading surgical associations during the past five years reveals that papers relating to trauma did not average ten per cent of the total number. The study of programs of numerous other associations reveals the fact that there is but small attention given to the surgery of trauma.

There is no branch of surgery growing more rapidly than the one which concerns itself with trauma. This

is due to our more rapid methods of transportation and the increased developments of industry. In spite of the fact that half of the surgical patients admitted to hospitals in America are said to be cases of trauma, the doctors who treat these patients are rarely particularly prepared in trauma. The problems presented by trauma are often perplexing. Internal injuries may present symptoms which may be vague and confusing for many hours. Keen judgment and dexterous skill may be demanded also when muscles, tendons, blood vessels and nerves are injured. An accompanying fracture may be the most obvious lesion and may be the least serious. Medical meetings for the cultivation and improvement of the science and art of the surgery of trauma will elevate the medical profession. The scope of this subject, whether the results of impact from a locomotive or the staggering blow from a surgical operation, permits and requires the application of the most advanced physiologic and pathologic information and therefore justifies its demand for increased recognition.

R. C. W.

AMERICAN STUDENT HEALTH ASSOCIATION

The twentieth annual meeting of the American Student Health Association will be held in New York on December 28 and 29 with headquarters at the Hotel New Yorker. In 1920 when this Association was organized there were 20 institutions represented at the first meeting. The present membership of the Association, numbering almost 200 institutions, is evidence of increasing interest in college health work and the increasing responsibility accepted by the college and university for the health of the students.

The young men and women in our colleges and universities offer an unusual group for effective health educational work through the college health services. These young people are in the formative years and are in college because they are eager for knowledge. The college health service has a unique opportunity to teach these young people the fundamentals of healthful living, the importance of seeking good medical care early in illness, the value of periodic health examinations, and how to distinguish between good, scientific medical care and that offered by unqualified practitioners.

The annual meeting of the American Student Health Association offers an unusual opportunity for all those engaged in the field of college health work to meet together and discuss the problems which are common to all. Through these meetings and the contributions from the representatives actively working in the field of student health, much is being done to crystallize the objectives of the college health program.

R. E. B.

BLACK-OUT FOR HEALTH

It took a war to bring to our attention a useful health measure. We have discussed before in these columns the desirability of a definite pause and relaxation from the strain incidental to a busy life. We have also stressed the value of the afternoon tea, cup of coffee, or other sweet drink for the four o'clock fatigue that may or may not be due to hypoglycemia. But these have been suggested as general health measures.

The much publicized black-outs that we read about in cities endangered by possible bomb raids at night leads to a practical thought in connection with the rest and preservation of a special organ. Every person from the proof-reader to the farmer uses his eyes from morn to night. Many use their eyes under adverse conditions—in poorly and artificially lighted offices—where these tired organs must apply themselves for long hours, often under great nervous strain.

We submit, therefore, the desirability of a few minutes' black-out in every busy day. The office worker can easily arrange to close his eyes for a short period. To make this procedure more effectual, the lights may be turned off, the door closed, and the shades drawn. The heart has its diastole and the kidney its intermittent periods of activity and rest, so why should we not learn to treat our eyes in a like manner? Some form of dark-room is usually available, and of course we can always resort to a simple closing of the lids for which nature has so thoughtfully provided.

A. E. H.

Book Reviews

The Red Book of Eye, Ear, Nose and Throat Specialists. Thirteenth Edition, 1939. Professional Press, Inc., 5 North Wabash Ave., Chicago, Ill.

This is the thirteenth edition of a register of specialists in the eye, ear, nose and throat field. It includes physicians in the United States, Alaska, Cuba, Hawaii, Canal Zone, Philippine Islands, Puerto Rico, Canada and Newfoundland. Abbreviated reference biographies of otolaryngological specialists are arranged by states and provinces. An alphabetical arrangement is also supplied along with some other reference data concerning special societies in this field. The book is fairly complete and should prove valuable to physicians who wish to refer patients for consultation to eye, ear, nose and throat specialists in their own localities.

Principles of Chemistry, by JOSEPH H. ROE, Ph.D., professor of biochemistry, School of Medicine, George Washington University, Washington, D. C. Fifth edition; 503 pages with illustrations and index. St. Louis: C. V. Mosby Co. 1939.

Though originally designed as an introductory textbook of inorganic, organic and physiological chemistry for nurses and other students of applied chemistry, the efforts made to stress the significance of chemistry and the interpretation of normal living processes and the emphasis placed on the relation of chemistry to life, make this book a valuable volume for im-

parting culture. The fifth edition of the book has brought the subject matter up to date and incorporated recent discoveries, such as those concerning the nucleus of the atom.

Discussions involving physiological chemistry have received full treatment and their application to the understanding of disease conditions outlined. Since it organizes in a straightforward fashion some of the latest knowledge on nutrition, vitamins and hormones, it may be of interest to physicians who wish to review this expanding field of knowledge.

For the student, the book has a valuable glossary of chemical terms that have won a regular place in clinical medicine.

Eye, Ear, Nose and Throat Manual for Nurses, by ROY H. PARKINSON, M.D., F.A.C.S., head oculist and aurist to St. Joseph's Hospital, San Francisco, Calif.; fourth edition, illustrated, 243 pages with index. St. Louis: C. V. Mosby Co. 1939.

This volume, now in its fourth edition, is a small non-technical treatise on the nursing care requisite in eye, ear, nose and throat cases. All material is presented in condensed and brief form with the idea of avoiding debatable questions and theories. Recent advances in methods and treatment are introduced in this latest edition to keep it up to date. Illustrations and instructions for recording visual fields and for the making of audiograms have been added.

The book is arranged in three parts; the first dealing with the general care of otorhinolaryngological cases, the second with operating room technic, and the third with the problems of the public health nurse. The volume has proved very valuable for classroom work in nurses' training schools. This edition is well printed and extensively illustrated. It can be recommended as a sound text.

Future Meetings

American Student Health Association Preliminary Program

Hotel New Yorker — New York City

December 28 and 29, 1939

THURSDAY, DECEMBER 28

Registration—9:00 to 9:30.

9:30 Call to Order by President—Dr. Charles E. Shepard, Stanford University.

11:00 Secretary's Report—Dr. Ruth E. Boynton, University of Minnesota.

Reports of Chairmen of Standing Committees (10 to 15 minutes each).

Committee on Local Sections—Dr. Dean F. Smiley, Cornell University.

Committee on Eye Health—Dr. R. W. Bradshaw, Oberlin College.

Committee on Tuberculosis—Dr. C. E. Lyght, Carleton College.

Committee on Organization and Administration—Dr. M. W. Husband, Kansas State College of Agriculture.

Committee on Health Service—Dr. R. I. Canuteson, University of Kansas.

Committee on Informational Hygiene—Dr. T. B. Kirkpatrick, Columbia University.

Committee on Hygiene of Physical Education Activities—Mr. W. R. LaPorte, University of Southern California.

Committee on Health Problems of College Women—Dr. Ruth Fairbank, Mount Holyoke College.

Appointment of Nominating Committee.

General Session—11:00 to 12:00.

A. The Philosophy of College Health Work. Speaker to be announced.

B. The Influence of the National Health Program on College Health Programs. Speaker to be announced.

Association Luncheon—12:30.

President's Address—Dr. Charles E. Shepard, Stanford University.

Round Table Sessions—2:00 to 3:30.

A. Committee on Health Service. Chairman: Dr. R. I. Canuteson, University of Kansas. General Topic: Examination Procedures and Record Forms. Discussion Leaders: Dr. H. D. Lees, Dr. Dorothea Scoville, Dr. A. V. Bock, Dr. A. O. DeWeese, Dr. J. Wilbur Armstrong.

B. Committee on Informational Hygiene. Chairman: Dr. T. B. Kirkpatrick, Columbia University. General Topic: Reference Materials and Teaching Aids in Hygiene Instruction. Presiding: Dr. C. E. Turner. Discussion Leaders: Dr. K. Frances Scott, Dr. J. Howard Beard, Dr. E. F. Van Buskirk.

Round Table Sessions—3:30 to 5:00.

C. Committee on Organization and Administration. Chairman: Dr. M. W. Husband, Kansas State College of Agriculture. General Topic: Student Infirmaries and Student Hospitals. Discussion Leaders: Dr. Irvin W. Sander, Dr. Grace M. Kahrs, Dr. William B. Brown, Dr. H. N. Kingsford, Dr. William Donald, Dr. George Blydenburgh, Dr. T. A. Storey.

D. Committee on Health Problems of College Women. Chairman: Dr. Ruth Fairbank, Mount Holyoke College. General Topic: Relation of Student Health Service to College Guidance Program. Discussion leaders: Dr. Ruth Collings, Dean Harriet Allyn, Dr. Jessie Herrick, Dr. Marjorie Smith, Dr. Helen Pryor.

E. Committee on Eye Health. Chairman: Dr. R. W. Bradshaw, Oberlin College. General Topic: Illumination Standards and Vision Testing Technique. Discussion leaders: Dr. Lee H. Ferguson, Dr. J. D. Schonwald.

(Abstracts of all discussions will appear in the Proceedings.)

Council Dinner—6:30.

FRIDAY, DECEMBER 29

Joint Session of American College Physical Education Association and the American Student Health Association—9:00 to 12:00.

Co-chairmen: Mr. W. R. LaPorte, American Student Health Association; Mr. Glen Howard, American College Physical Education Association. Theme: Health Implications, Responsibilities and Problems of the Physical Educator.

9:00 to 9:20 A. M. The Inter-Relationships of School Health and Physical Education—Dr. J. E. Raycroft, Princeton University.

9:20 to 9:40 A. M. The Administration of School Health and Physical Education as an Integrated Unit—Mr. Sheiler M. Lawton, New York University.

9:40 to 10:00 A. M. The Relationships of Physical Educator and Physician—Dr. Dean F. Smiley, Cornell University.

10:00 to 10:30 A. M. Questions and Panel Discussion.

(5 minute recess)

10:35 to 10:50 A. M. The Place of the Physical Education Teacher as a Health Counselor—Dr. T. Bruce Kirkpatrick, Columbia University.

10:50 to 11:05 A. M. The Physical Education Teacher's Responsibility for Health Instruction—Miss Mabel Rugen, University of Michigan.

11:05 to 11:20 A. M. Opportunities for Mental-Emotional Health Guidance in Restricted and Remedial Activities—Mr. George Stafford, University of Illinois.

11:20 to 12:00 A. M. Questions and Panel Discussion.

Council Luncheon—12:30.

Tuberculosis Committee Luncheon—12:30.

Presiding: Dr. Kendall Emerson, Managing Director, National Tuberculosis Association. Report of Tuberculosis Committee—Dr. Charles E. Lyght, Chairman. Dividend from a Tuberculosis Control Project Among Students—Dr. J. Burns Amberson, Jr., Professor of Medicine, Columbia University, New York City.

Business Meeting—2:00 to 2:30.

Report of Council Meetings.
Report of Nominating Committee.

General Session—2:30 to 4:30.

- A. Committee on Organization and Administration. Chairman: Dr. M. W. Husband, Kansas State College of Agriculture and Applied Science. Floor Plan of a New Health Service Building—Dr. W. E. Forsythe, University of Michigan.
- B. Committee on Informational Hygiene. Chairman: Dr. T. B. Kirkpatrick, Columbia University. Contribution of the Physical and Health

Education Teacher to the Guidance Program—Dr. Ruth Strang, Teachers College, Columbia University.

- C. Committee on Mental Hygiene. Chairman: Dr. Theophile Raphael, University of Michigan. Epilepsy Among College Students—Dr. Leonard Himler, University of Michigan.
- D. Committee on Health Service. Chairman: Dr. R. I. Canuteson, University of Kansas. Contagious Diseases in College Students—Dr. Llewellyn R. Cole, University of Wisconsin. Indications for Use, Actions, and Complications of the Sulfanilamide Group—Dr. B. I. Comroe, University of Pennsylvania.
- E. Committee on Eye Health. Chairman: Dr. R. W. Bradshaw, Oberlin College. Paper (subject and speaker to be announced).

General Discussion.

Introduction of New President.

Adjournment.

With the advent of the 33rd annual Christmas Seal campaign, the attention of the nation is again focused on tuberculosis.

Certain wise men of thirty-five years ago, as they gathered together for the purpose of laying out a plan to fight tuberculosis, realized that it required a long-range program of education of the public. They foresaw, that while we did not have a specific cure for tuberculosis we did possess enough knowledge of its treatment and of effective preventive measures to lead on to final victory, if we could only put this knowledge into operation.

Thus the campaign against tuberculosis was launched. In a word it consisted of enlisting the services of the whole nation in the fight. It was a task far too big for the physicians and nurses to carry on alone. They were the officers. The troops were the people themselves. Mustering the army and training it to fight required a nation-wide campaign.

Mobilization is only a first step. Next must come equipment and training of the troops. The effective weapon against tuberculosis is a knowledge of the disease, the way it is spread in a community, the precautions to take against infection, the safest method of treatment if infection has taken place. That knowledge can only be gained through health education. The tuberculosis campaign made possible by Christmas Seals has been a long program of educating the public in the rules of health living.

The evidence that gives us greatest reassurance is the fact that during these past few years the death rate

CHRISTMAS SEALS

*Help to Protect Your
Home from Tuberculosis*

from tuberculosis has continued its steady decline. In time of war, in periods of widespread hardship and distress, the reverse has hitherto always been true.

Nothing could be more stupid than to presume too far on this striking reversal of the accepted rule. Over-confidence has been the undoing of many a well trained army. Not only must there be no relaxation in our own fighting spirit, but we must also continue indefinitely to keep up our defenses, for the tubercle bacillus is a relentless fighter. He knows no quarter. We must give him none.

In spite of the improvement of diagnostic methods, only 13 per cent of patients admitted to sanatoriums are found to be in the early stages of the disease, thus showing that there are far too

many with unrecognized cases in the community infecting their families and neighbors. Only by finding every case can the disease be eliminated. Early examination, skillful diagnosis and prompt treatment are the factors that make tuberculosis curable and preventable. Persons with questionable cases should be promptly examined.

In this campaign, the medical profession has always taken a leading part. Among the endorsements received is the following from Dr. Rock Sleyster of Wauwatosa, Wisconsin, president of the American Medical Association.

Dr. Sleyster said, "It is a pleasure, indeed, to give my hearty endorsement to the Christmas Seal Campaign of the National Tuberculosis Association. I have been actively interested in this promotion for the last quarter of a century."

News Items

Dr. B. M. Stevenson, Fulda, Minnesota, was elected president of the Southwestern Minnesota Medical association at the annual meeting held in Worthington October 20, 1939. Dr. P. W. Harrison, Worthington, was named vice president, and Dr. H. DeBoer re-elected secretary-treasurer.

Dr. S. J. Raetz of Watkins, Minnesota is now practicing in Maple Lake. He has taken over the practice of the late Dr. V. Rousseau.

Dr. F. E. Boyd, formerly of Mitchell, South Dakota is now in charge of the New Community Hospital at Flandreau.

Dr. J. C. Litzenberg, Minneapolis, became president of the Central Association of Obstetricians and Gynecologists at the annual convention of the association in Kansas City.

Dr. Robert Tudor of Minneapolis is assisting at the Cokato, Minnesota, hospital while Dr. Arthur Thompson continues graduate study at the University of Minnesota Medical school.

Dr. W. B. Cannon, professor of physiology at Harvard medical school, made three addresses before the medical students of the University of North Dakota on October 11. His subjects were: "Maintenance of Bodily States," "Chemical Mediation of Nerve Impulses," and "Effects of Strong Emotions." Dr. Cannon's visit was made possible by the coöperation of the School of Medicine; Sigma Xi, graduate club; and the Grand Forks District Medical Society.

The Hennepin County Tuberculosis Association has just completed a 15-minute color film telling the story of the rehabilitation of a tuberculosis patient. The film traces the story of a 22 year old girl, a factory employee, from the time of breakdown, through sanatorium treatment, education within the sanatorium, restraining and care after discharge and back to self-support. It presents the work of the association, of Glen Lake Sanatorium, the Minneapolis Board of Education and the State Division of Rehabilitation. Sanatorium scenes were made at Glen Lake. Sarahurst, home for discharged patients during the period of retraining, which has been maintained by the Hennepin County Tuberculosis Association for the past 11 years, provides the background for other scenes. The film was commended at its first showing at the recent Southern Tuberculosis Conference, at Charleston, South Carolina. Combining a moving human interest story with the mechanics of an effective rehabilitation plan, it appeals to both the laity and those interested in this phase of tuberculosis work.

The Advisory Board for Medical Specialties will issue in December the first edition of the Directory of Medical Specialists listing the more than 16,000 specialists certified to date by the twelve American boards and the two affiliate boards in the specialties. This directory will have three sections. The first will be devoted to a brief

discussion of the Advisory Board for Medical Specialties, its organization and objectives. The second section will have fourteen separate divisions, one for each American board with a geographic and a detailed biographic listing of its diplomates. Each of these divisions will give full information regarding requirements for admission to examinations for certification, details of organization of each board, and other general information. The third and final section will be a complete alphabetic list of all the 16,000 diplomates, with their addresses and indications of specialty certification. It is expected to issue the directory every two years. No charge is made for any listing in the directory, and only the names of the specialists certified by the American boards will be included.

The three thousand mark in confinements was reached recently at St. Joseph's Hospital, Dickinson, North Dakota. Deliveries in this hospital now average nearly two hundred per year. The hospital was first opened in 1911, and is run by the Sisters of Mercy of the Holy Cross, whose Motherhouse in this country is in Merrill, Wisconsin, and chief Motherhouse is located at Ingebohl, Switzerland.

ATTENTION SECRETARIES OF DISTRICT SOCIETIES

Space is at your disposal in *The Journal-Lancet* for advance notices and reports of meetings of your society and personal news items concerning members of your society. County and district secretaries are invited to forward such material to *The Journal-Lancet*, 84 S. 10th St., Minneapolis.

Necrology

Dr. S. A. Zimmerman, 62, Valley City, North Dakota died November 23, 1939.

Dr. John J. Mertens, 70, retired Gettysburg, South Dakota physician and a former Potter county senator, died recently. He was a graduate of the University of Minnesota Medical School.

Dr. Edward L. Palsen, 56, St. Paul, Minnesota died October 7, 1939.

Dr. Martha B. Moorhead, 73, Minneapolis, Minnesota died October 13, 1939. Dr. Moorhead was one of the first instructors of public health at the University of Minnesota.

Dr. Anton J. Moe, 71, Sioux Falls, South Dakota died October 18, 1939.

Dr. E. A. Pray, 71, pioneer physician of Valley City, North Dakota died in Fargo November 16, 1939.

Dr. Will H. Moore, 63, Valley City, North Dakota, died in Fargo October 20, 1939. Dr. Moore had practiced in North Dakota since 1908.

Dr. G. A. Stevenson, 84, Albert Lea, Minnesota died October 25, 1939.

Dr. E. E. Wands, 63, formerly of Lisbon, North Dakota died last month. Because of illness, Dr. Wands had not been practicing the past few years.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
ON NOVEMBER 3, 1939

OCTOBER EXAMINATION

Name	School	Address
Anderson, Charles Leonard	U. of Minn., M.B. 1939, M.D. 1939	69 E. 4th St., Proctor, Minn.
Brown, George Emerson	U. of Minn., M.B. 1938, M.D. 1939	Mayo Clinic, Rochester, Minn.
Brown, Joe Robert	U. of Iowa, M.D. 1937	Mayo Clinic, Rochester, Minn.
Burkland, Carl Edwin	Johns Hopkins, M.D. 1935	Ancker Hospital, St. Paul, Minn.
Cowan, Jack Thomas	Northwestern, M.B. 1938, M.D. 1939	Ancker Hospital, St. Paul, Minn.
Donald, Charles Johnson, Jr.	Tulane U., M.D. 1936	Mayo Clinic, Rochester, Minn.
Elliott, James Francis	U. of Alberta, M.D. 1936	Mayo Clinic, Rochester, Minn.
Gambill, Earl Edward	U. of Pennsylvania, M.D. 1935	Mayo Clinic, Rochester, Minn.
Golden, Robert Fred	Geo. Washington U., M.D. 1937	Mayo Clinic, Rochester, Minn.
Hall, Howard	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Heilman, Charles	Northwestern, M.B. 1934, M.D. 1935	Mayo Clinic, Rochester, Minn.
Hoidale, Porter Madeira	U. of Minn., M.B. 1939	Miller Hospital, St. Paul, Minn.
Hughes, John Davis	U. of Tenn., M.D. 1935	Mayo Clinic, Rochester, Minn.
Hughes, Theodore James	McGill U., M.D. 1937	Mayo Clinic, Rochester, Minn.
Hummer, George John	Rush Med. Col., M.D. 1937	Mayo Clinic, Rochester, Minn.
Hunt, Robert Sellen	Northwestern, M.B. 1938	Fairmont, Minn.
Johnson, Clive Roland	Rush Med. Col., M.D. 1937	Mayo Clinic, Rochester, Minn.
Kallestad, Leonard Lester	U. of Minn., M.B. 1938, M.D. 1939	Mpls. General Hospital, Minneapolis, Minn.
Knudson, Alvin Bernt Clifford	U. of Minn., M.B. 1938, M.D. 1939	2329—27th Ave. S., Apt. 4, Mpls., Minn.
Kvarnes, Robert Gordon	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Lien, Richard J.	U. of Minn., M.D. 1937	Mayo Clinic, Rochester, Minn.
Lipscomb, Paul Rogers	Med. Col. of S. Car., M.D. 1938	Mayo Clinic, Rochester, Minn.
Mader, James Wilson, Jr.	U. of Pennsylvania, M.D. 1937	Mayo Clinic, Rochester, Minn.
Mattson, Albert Donald	U. of Minn., M.B. 1939	St. Mary's Hospital, Duluth, Minn.
Mears, Robert Fuller	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Pattison, Donald Haggart	U. of Wis., M.D. 1936	Mayo Clinic, Rochester, Minn.
Pearson, Clarence Coplyn	U. of Texas, M.D. 1937	Mayo Clinic, Rochester, Minn.
Peterson, Wendell Gladstone	U. of Minn., M.B. 1938, M.D. 1939	Mayo Clinic, Rochester, Minn.
Poppe, Frederick Paul	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Power, Harry Waldo	Northwestern, M.B. 1938, M.D. 1939	Ancker Hospital, St. Paul, Minn.
Quick, Edwin Danford	U. of Minn., M.B. 1936, M.D. 1937	Mayo Clinic, Rochester, Minn.
Schmidt, Mary Alice	U. of Minn., M.B. 1938, M.D. 1939	University Hospital, Minneapolis, Minn.
Shelden, James Thomas	U. of Minn., M.B. 1937, M.D. 1938	Mayo Clinic, Rochester, Minn.
Stromme, William Brown	U. of Minn., M.B. 1939	University Hospital, Minneapolis, Minn.
Studer, Donald James	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Subby, Walter, Jr.	U. of Minn., M.B. 1939	Bethesda Hospital, St. Paul, Minn.
Travis, James S.	Rush Med. Col. M.D. 1938	St. John's Hospital, Fargo, N. Dak.
Trimingham, Hugh Gerald Loch	McGill, M.D. 1937	Mayo Clinic, Rochester, Minn.
Weible, Ralph Darrow	U. of Minn., M.B. 1938	Mpls. General Hospital, Minneapolis, Minn.
Wellner, Theodore Otto	U. of Minn., M.B. 1939	University Hospital, Minneapolis, Minn.
Wood, Benjamin J.	U. of Pittsburgh, M.D. 1938	Mayo Clinic, Rochester, Minn.
Wozencraft, Jean Paul	U. of Cincinnati, M.B. 1938, M.D. 1939	Mayo Clinic, Rochester, Minn.
Wright, Donovan George	U. of Minn., M.B. 1938, M.D. 1939	751 E. 17th St., Apt. 102, Minneapolis

BY RECIPROCITY

Adair, Albert Franklin, Jr.	U. of Tenn., M.D. 1934	1027 Lowry Med. Arts Bldg., St. Paul, Minn.
Anderson, David Perrin, Jr.	U. of Pennsylvania, M.D. 1934	Austin Clinic, Austin, Minn.
Kent, Herbert Knight	Loyola U., M.D. 1929	311 S. Pine St., Lansing, Mich.
Kisner, Paul	Washington U., M.D. 1935	916 E. 15th St., Minneapolis, Minn.

NATIONAL BOARD CREDENTIALS

Clapp, Stewart	Geo. Washington U., M.D. 1937	1926 W. Superior St., Duluth, Minn.
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