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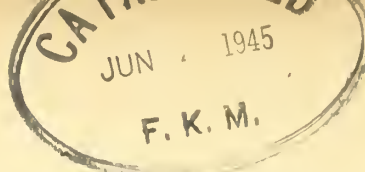
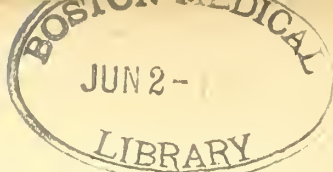
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January 1944 - December 1944

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Montana State Medical Association
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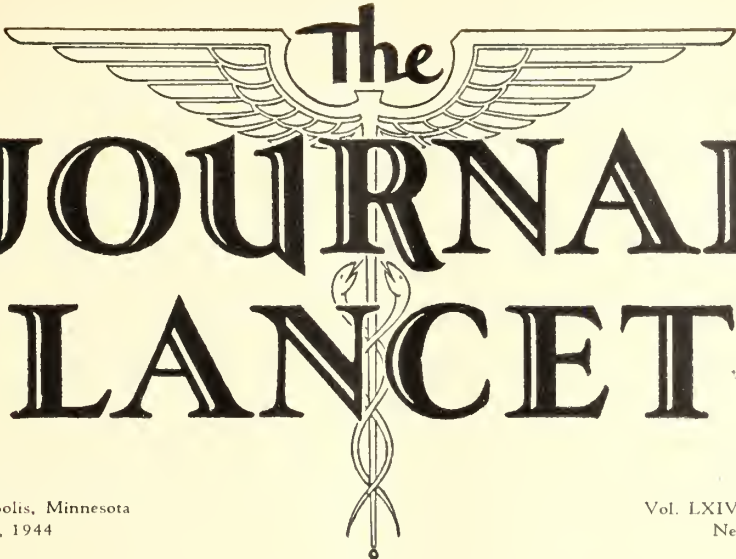
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Hemorrhagic Disease of the Newborn* *Prevention and Treatment with Vitamin K*

L. G. Pray, M.D.

Fargo, North Dakota

HEMORRHAGIC disease of the newborn is said to occur in about 0.7 per cent of newly born infants. The usual time of appearance is between the second and fourth days of life, although cases have been known to have their onset as early as the first day or as late as the second week. There is seasonal variation; the greatest incidence is during the late winter and early spring months. The bleeding is oozing in type; it may come from almost any portion of the body; the umbilicus, cutaneous surfaces and bowel are favorite sites; it is often initiated by trauma. The relationship of the bleeding tendency to intracranial hemorrhage is generally accepted, but the degree of correlation has not been exactly appraised. The blood picture is characterized by prolongation of the coagulation time, with less or no lengthening of the bleeding time. Until recently, the most widely approved treatment of hemorrhagic disease has been the intravenous, intramuscular and subcutaneous administration of blood. Blood transfusion is a therapeutic agent of proved worth, but the efficacy of intramuscular or subcutaneous blood has been largely disproved. The reader is referred to the excellent monograph of Salomonsen¹ for a complete discussion of the subject.

That lack of prothrombin is the cause of hemorrhagic disease was suspected as long ago as 1912,² but it was not until 1937 that this concept of pathogenesis gained wide acceptance. At that time, Brinkhous, Smith and Warner³ demonstrated by means of a new method that the plasma prothrombin levels of newborn babies are much lower than the normal adult values. It has also been shown that premature infants tend to have a lower prothrombin level than full-term babies.^{4,5} The importance

of prothrombin to the clotting mechanism is indicated by the accompanying diagram taken from Quick.⁶

Prothrombin + Calcium + Thromboplastin → Thrombin
Thrombin + Fibrinogen → Fibrin

Vitamin K was discovered by Dam^{7,8} in 1935, and has since been isolated and synthesized. A fat-soluble substance of quinoid structure, it has been extracted from alfalfa meal and putrefied fish meal, and has been shown to be present in many foods, particularly spinach, cabbage, kale and cauliflower; the content is said to be low in human milk and cow's milk. Several investigators^{9,10,11,12} demonstrated independently the vitamin K activity of 2-methyl-1, 4-naphthoquinone; this potent synthetic compound, given the name "Menadione" by the Council on Pharmacy and Chemistry of the American Medical Association,¹³ is the substance which we have used in treatment. Many chemical compounds of closely related structure possess vitamin K activity. Their mode of action in accelerating formation of prothrombin in the liver is not known exactly; it is thought to be catalytic. Brinkhous¹¹ has made a comprehensive survey of present knowledge concerning vitamin K.

Waddell and his coworkers^{15,16} showed the curative effect on hemorrhagic disease of the newborn of a vitamin K concentrate given to the infant, and also the prophylactic effect of giving the vitamin to mothers prior to delivery. The extensive work of Hellman and his associates^{4,5,17,18,19} confirmed the latter observation. Reports of successful treatment of hemorrhagic disease with preparations having vitamin K activity are numerous; oral, intramuscular and intravenous routes have been employed; in the latter cases water-soluble compounds have been used.

The following study was conducted in the nurseries of

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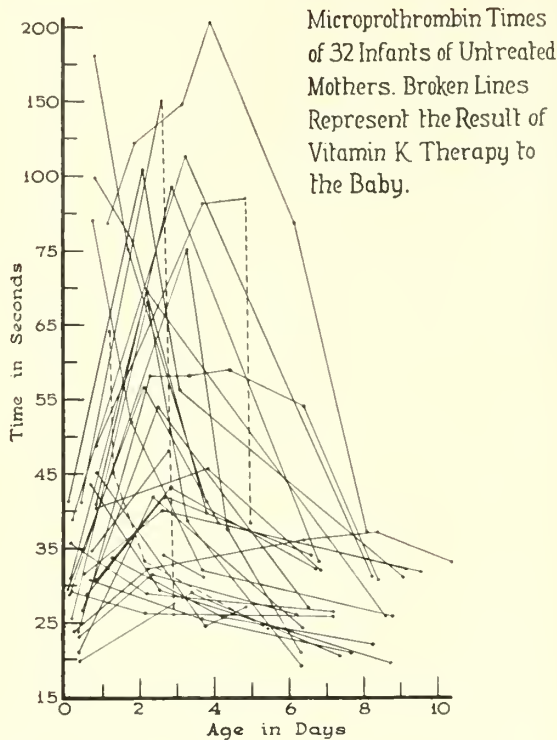


Fig. 1.

the Columbia Presbyterian Medical Center, New York City, with the collaboration of Drs. H. S. McKeown and W. E. Pollard; it has been reported elsewhere.²⁰

The principal objective of our investigation was to evaluate the prophylactic effect on hemorrhagic diathesis in the newborn of antenatal administration of menadione 2-methyl-1, 4-naphthoquinone³ to mothers; a few observations on treatment have also been made. The responsibility for the study was divided; one of us (W. E. P.) supervised the therapy of the mothers; another (H. S. McK.) examined the eye-grounds of the infants; and the third (L. G. P.) made serial determinations of microprothrombin time in the babies and instituted treatment when necessary. Measurements of prothrombin time were not made on the mothers, as no constant correlation has been found^{4,5,17} between the levels in mothers and their infants. Determinations of coagulation time were made on a relatively small number of the babies simultaneously with the prothrombin times.

The expectant mothers were divided into three categories. One group received menadione before delivery for periods varying from three days to six weeks; a second group was treated during labor; a third was given no medicinal vitamin K. A preparation of 2-methyl-1, 4-naphthoquinone in tablet form[†] was used.

TECHNIC OF DETERMINING PROTHROMBIN TIME

For the determination of prothrombin times a simple bedside method was used, based on a procedure suggested by Quick,²¹ and incorporating features utilized by Ziffren and his associates²² and by Kato.²³ Since the

[†]Proklot. Eli Lilly and Co.

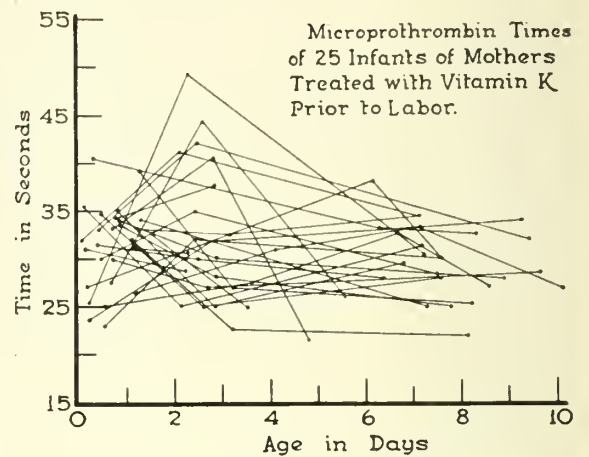


Fig. 2.

completion of this investigation, the application of an almost identical method was reported by Lawson.²⁴

Thromboplastin is prepared from the fresh brain of a young rabbit by removing vessels and meninges, grinding in a mortar and extracting with cold acetone at least four times, then removing the excess acetone by filtration. The residue is dried in the incubator overnight at 37° C. The resulting powder will retain its potency for approximately a month if kept tightly stoppered in a refrigerator. In order to prepare the suspension of thromboplastin for use in the test, 0.3 Gm. of the powder is thoroughly shaken with 5 cc. of isotonic sodium chloride solution in a clean test tube, which is then placed in a water bath at 45° C. to 50° C. for from 10 to 15 minutes. The thromboplastic suspension is then ready for use; it may be employed for several days if kept in the refrigerator when not needed; its potency is checked daily by estimating the microprothrombin time of a healthy adult. Before use the suspension is shaken and allowed to settle; the turbid supernatant fluid is utilized. It should be allowed to come to room temperature before use.

The required apparatus includes several 0.1 cc. pipettes, small glass rods, a stop-watch, a porcelain spot plate, and a pointed knife blade. The test is made at the infant's bedside. The heel is cleaned with alcohol and an incision is made about 2 mm. long and approximately the same depth; the heel is then wiped vigorously with a dry sponge to stimulate the flow of blood. One-tenth of 1 cc. of blood is drawn up in a pipette; if that amount cannot be easily obtained, as little as 0.05 cc. can be used. The blood is immediately transferred to the spot plate, and an equal amount of thromboplastic suspension quickly added. Simultaneously the stop-watch is started and the mixture is agitated with a small glass rod. Vigorous stirring is continued for 5 seconds, after which the rod is drawn slowly back and forth through the mixture to determine the end-point, which is the time when the preparation jells. The watch is stopped at the instant clotting is perceived.

The time required for coagulation to occur is designated as the microprothrombin time. In over 90 per cent

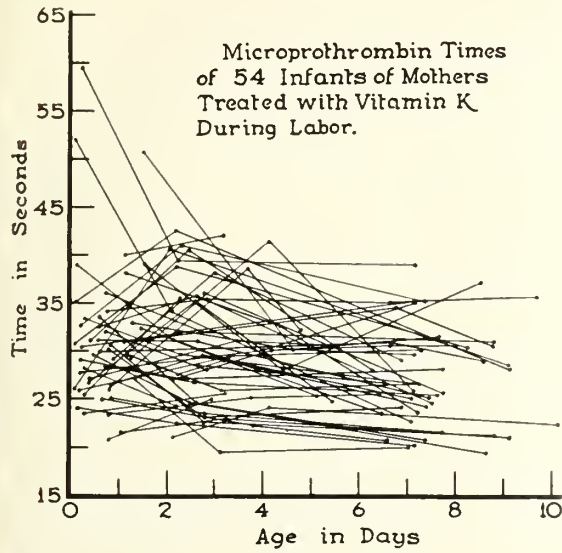


Fig. 3.

of the normal control determinations, the microprothrombin time was between 17 and 26 seconds. This represents a greater variation than that reported by Lawson,²⁴ due probably to less uniformity in our thromboplastic preparation. That this factor is the chief one is suggested by improved uniformity in a small number of determinations made more recently with a standardized preparation.‡

The performance of the test is simple; repeated determinations can easily be made on the same infant; this is not feasible with the usual methods requiring venous blood. The general plan was to perform the test on the first, third and seventh days of life, but this schedule was varied in individual cases.

OBSERVATIONS OF PROTHROMBIN TIME IN INFANTS

Curves showing the microprothrombin times of 32 normal full-term infants whose mothers received no vitamin K are seen in Figure 1. In general there is a tendency toward prolongation on the second and third days with a gradual return to normal after that time, but there are marked individual variations; several babies showed extreme prolongation on the first day. Two of these infants bled abnormally; a third had cephalhematoma; the prothrombin times of all three responded promptly to vitamin K in oil §, given by mouth in two cases and in one case intramuscularly. In the two babies with external bleeding, the hemorrhage stopped within two hours after treatment; it was difficult to evaluate the effect on the cephalhematoma, although no further enlargement was noted.

The effect of administering menadione to the mother may be seen by referring to Figure 2 and Figure 3. Figure 2 shows the microprothrombin curves of 54 infants of mothers treated during labor. Figure 3 presents similar curves of 25 infants of mothers treated before labor. There is no demonstrable difference between the

‡Bacto-Thromboplastin (from rabbit brain). Difco Laboratories, Detroit, Michigan.

§Thyloquinone (2-methyl-1, 4-naphthoquinone) in oil, Squibb.

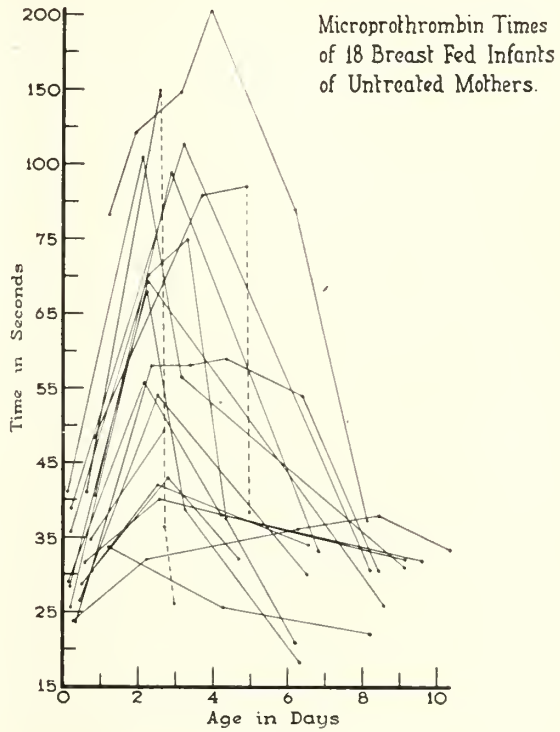


Fig. 4.

two groups. Both fail to show the prolongation of prothrombin times ordinarily seen in the untreated cases.

There was conspicuous difference between the breast-fed and the bottle-fed infants of untreated mothers with respect to the types of microprothrombin curves. Figure 4 shows the breast-fed infants; in general their microprothrombin times are much more prolonged on the second and third days than is true in the bottle-fed babies (Figure 5). The latter tend to approach normal values rapidly without undergoing the prolongation characteristic of the breast-fed infants. Figure 6 shows the contrast in prothrombin levels which occurred in double ovum twins after the first day; the breast-fed infant developed hemorrhagic disease which responded to menadione (Case 1), while the bottle-fed baby maintained a normal course.

RETINAL HEMORRHAGES

Examination of the fundi was made in almost every infant; this was done during the first ten days, in the majority of cases during the first 72 hours. It is occasionally difficult to obtain a good view of the eye-grounds during the first two or three days if the infant has chemical conjunctivitis. Ordinarily it may be done without too much difficulty if the pupils are dilated with homatropine, 0.5 per cent, and the baby appeased by means of a bottle containing sugar solution or formula.

Table I illustrates the striking decrease in the incidence of retinal hemorrhages in the infants of treated mothers as compared with those who were untreated. There were retinal hemorrhages in 44 per cent of the untreated cases; some of the hemorrhages were fairly

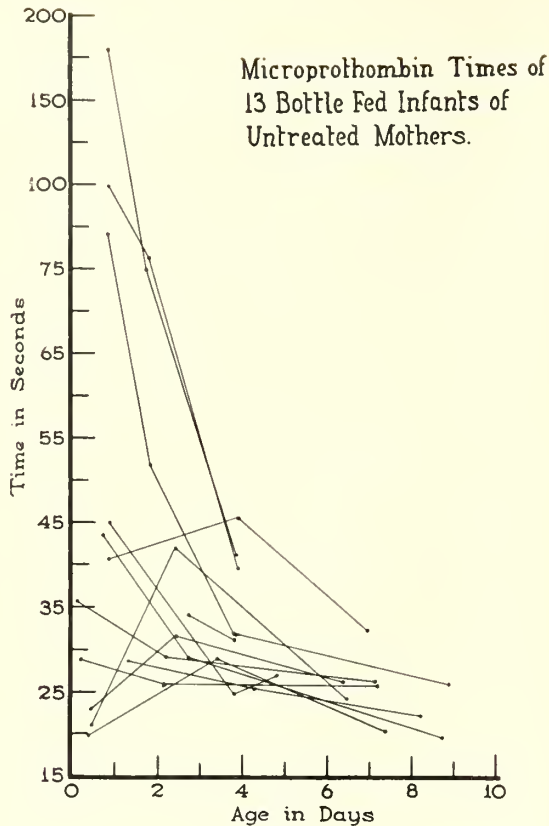


Fig. 5.

large; their incidence corresponds closely with that found in a previous study by McKeown²⁵ of 498 newborn infants. In the cases in which menadione was not given until after the onset of labor, retinal hemorrhages were present in 19 per cent; in over half of the cases the hemorrhages were moderately large. In the cases in which the mothers received menadione prior to labor there were retinal hemorrhages in only 13 per cent; none of these hemorrhages was large. Statistical examination of these data by the method of chi-square demonstrates a highly significant difference between the infants of treated and those of untreated mothers; between the two treated groups there is no significant difference. However, the size as well as the number of hemorrhages provides some evidence that administration of menadione prior to the onset of labor may afford more effective prophylaxis. Maumenee and his associates¹⁹ recently reported definite reduction in the incidence of retinal hemorrhages as a result of antenatal vitamin K therapy; this effect was significantly greater in the group treated before labor than in those treated during labor alone.

CASES OF HEMORRHAGIC DISEASE TREATED WITH VITAMIN K

Case 1. Y., colored male, one of double ovum twins, was born in January, 1941, following a labor of 15 hours and a spontaneous vertex delivery. Birth weight was 3470 gm. No vitamin K was administered to the mother; this was her second pregnancy. The infant was breast-fed throughout the hospital stay, receiving, in addition, 5 per cent sucrose water during the first three days. Feedings were taken well; the weight dropped

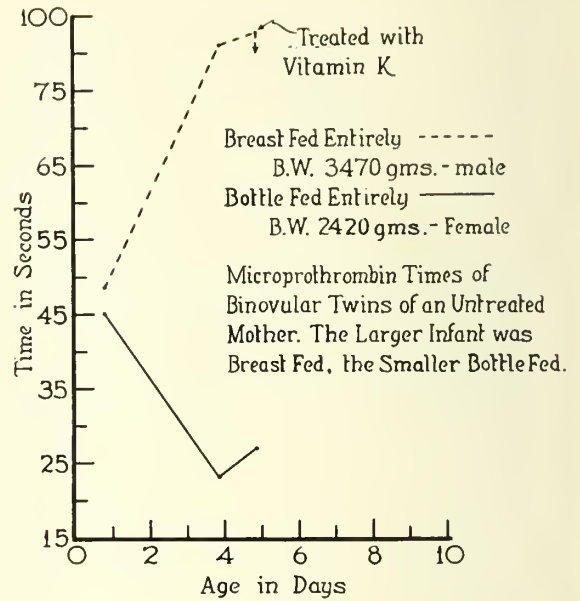


Fig. 6.

to a low figure of 3120 gm. on the fifth day; it was 3270 gm. on the tenth day. The microprothrombin time was 48.5 seconds on the first day, compared to a normal control of 25 seconds. Examination of the eye-grounds on that day showed large and small flame-shaped hemorrhages above and below the optic discs. On the fourth day the microprothrombin time was 89 seconds, as compared with a control of 22 seconds. The next day the microprothrombin time was 93 seconds, with a control value of 18 seconds. The coagulation time was 4 minutes. It was discovered at that time that the heel prick from the previous day was still oozing, and vitamin K therapy was therefore thought to be indicated. Thyloquinone (2-methyl-1, 4-naphthoquinone) in oil, 2 mg. was given by mouth. One and one-half hours later the oozing had stopped; the microprothrombin time was 38 seconds, control 18 seconds. One and three-fourths hours after that, the microprothrombin time was 43 seconds; the coagulation time was 2½ minutes. An hour and a half later the microprothrombin time was 37 seconds; the coagulation time had remained the same. The following morning, 23 hours after administration of vitamin K, the microprothrombin time was 19 seconds, with a control of 16 seconds; the coagulation time was 1¾ minutes. Two days later the microprothrombin time was approximately the same. The baby was discharged on the tenth day in good condition.

The course of the other twin was in marked contrast to that of the boy just described (Fig. 6). The girl weighed 2420 gm. at birth; on formula feedings she gained satisfactorily and was 150 gm. over birth weight by the tenth day. The microprothrombin time was normal after the first day.

Case 2. F., white male, was born during February, 1941, the second child of a normal mother, following a labor of two hours and a spontaneous vertex delivery. No vitamin K prophylaxis was given. Birth weight was 3430 gm. Moderate icterus appeared on the first day and persisted. Physical examination was otherwise negative and hemoglobin level and red and white blood cell counts were normal. The baby did well generally until the ninth day, when there was a small amount of oozing from the umbilical cord, which was beginning to loosen. On the tenth day profuse oozing from the umbilicus began suddenly, enough to soak through several abdominal binders and a number of gauze dressings before it was stopped. Microprothrombin time a few minutes after the onset of the bleeding had no end-point, and the coagulation time was longer than 15 minutes. Thyloquinone in oil, 2 mg., was given intramuscularly. Fifty minutes later there was still no end-point of the microprothrombin time, but the coagulation time was 5½ min-

utes; the bleeding had not diminished. A dressing moistened with epinephrine solution was applied with a tight binder, without demonstrable effect on the bleeding. More vitamin K (4 mg. of thyloquinone in oil) was given intramuscularly 25 minutes later, 1¼ hours after the first dose. Ten minutes later the coagulation time was 4¾ minutes, and bleeding time was 1¾ minutes. The red blood cell count and hemoglobin level were essentially as on the first day; there were two nucleated erythrocytes per 100 leukocytes. Microprothrombin time 2½ hours after the first injection of vitamin K was 106 seconds, with a control of 23 seconds. By that time the oozing had become slight, and had been so for about one-half hour previously. The microprothrombin time 4 hours and 5 minutes after treatment was begun was 58 seconds; coagulation time was 2½ minutes. Bleeding had practically stopped. Two hours and 50 minutes later the microprothrombin time was 35 seconds; coagulation time was two minutes. No bleeding whatever was occurring at that time. The following day, 22 hours after institution of therapy, the microprothrombin time was 29 seconds, control 24 seconds; coagulation time was two minutes. The values remained within normal limits after that time.

Case 3. M., white male, was born during December, 1940, the seventh child of a normal mother who received no medicinal vitamin K. Labor lasted 1½ hours; delivery was spontaneous. Birth weight was 3930 gm. The microprothrombin time on the first day was 41 seconds, control 16 seconds; the coagulation time was three minutes. The baby was breast-fed throughout, and took feedings well; at the time of discharge on the ninth day he was 130 gm. under birth weight. On the second day of life the eye-grounds showed no retinal hemorrhages. The following day the microprothrombin time was 150 seconds, with a control value of 22 seconds; the coagulation time was 5½ minutes. Vitamin K (2-methyl-1, 4-naphthoquinone) in oil, 2 mg., was administered intramuscularly into the buttock. An hour and 35 minutes later the microprothrombin time was 52 seconds, and the coagulation time was four minutes. A heel prick made almost three hours before was still oozing. Two hours and five minutes after therapy the microprothrombin time was 36 seconds; the coagulation time was 2¾ minutes; oozing from the heel had stopped. Nine hours and twenty minutes after treatment the microprothrombin time was 26 seconds. The following day, a little less than 24 hours following the intramuscular vitamin K, the microprothrombin time was 27 seconds, with a control of 22 seconds. The course thereafter was uneventful.

DISCUSSION

Our results confirm the findings of others that the administration of vitamin K to expectant mothers, either during the latter part of pregnancy or during labor, results in approximately normal prothrombin values in their infants and virtually eliminates the prolongation in prothrombin time which usually occurs in untreated cases between the second and fourth days of life. Menadione (2-methyl-1, 4-naphthoquinone) was used in treatment; it is one of the most potent preparations having vitamin K activity. This was given during the latter part of pregnancy in doses of 2 mg. three times a day in tablet form; it is likely that a dosage of 1 or 2 mg. daily would have accomplished the same result. Hellman and his associates¹⁷ report better utilization of vitamin K in an oily medium than in pills made up with lactose. We did not try different amounts or different forms of the drug.

The dosage used during labor was 20 mg. in most cases; in a few instances in which 10 mg. were given there was an equal prophylactic effect; again it is quite possible that smaller doses would have been equally effective. There was no direct correlation between the prothrombin times of the infant and the time interval between treatment and delivery, except in one case in which less than an hour elapsed; in that case the micro-

TABLE I
Incidence of retinal hemorrhages in infants of mothers (a) who received no vitamin K, (b) who received vitamin K during labor, (c) who received vitamin K prior to labor.

Total Cases	Incidence of Hemorrhages		Size of Hemorrhages	
	No. of Cases	Per Cent	Small	Larger
(a) 25 untreated cases	11	44	7	4
(b) 53 cases treated during labor	10	19	4	6
(c) 23 cases treated prior to labor	3	13	3	0

prothrombin times followed a curve typical of the untreated cases.

An incidental finding of some interest is that formula feedings during the first few days of life, either alone or supplementary to breast feedings, counteract the prolongation of prothrombin time which occurs ordinarily in untreated cases, providing the baby is breast-fed. In cases in which the initial prothrombin time was abnormally long, the introduction of formula feedings quickly brought the prothrombin time to a value close to normal. These findings agree with those of Salomonsen and Nygaard,²⁶ who attribute the difference to a more rapid development of intestinal flora in infants given supplemental feedings shortly after birth. They quote Almquist and his coworkers,²⁷ who found that some species of bacteria form a vitamin K active substance as a metabolic product. That this may not be the entire answer is suggested by a preliminary experiment in one of our infants who was given sulfanilylguanidine in full doses beginning 12 hours after birth; in spite of the fact that one might expect this drug to keep bacterial growth below usual levels in the intestinal tract,²⁸ the prothrombin time rapidly approached normal on formula feedings. It seems probable that the relative starvation during the first three days in breast-fed infants is the important factor in the failure to form prothrombin, but we are unable to go further than that. This should not be taken as an endorsement of formula feedings in preference to the breast, as other advantages of mothers' milk outweigh this consideration; however, it might indicate the advisability of supplementary formula feedings in cases in which neither the mother nor the baby has received vitamin K.

The prompt curative action of menadione in oil in hemorrhagic disease of the newborn is shown in three such cases reported in detail. This acted with equal rapidity whether given by mouth or intramuscularly; the dosage was 2 mg. to 6 mg.; within two hours bleeding stopped entirely or almost completely in each instance. There was apparently no need to repeat the initial dose, although, in one case associated with severe bleeding, two injections were given about an hour apart. It is our feeling that the intramuscular route is the preferable one in severe cases, because the possibility of loss by vomiting is eliminated.

The microprothrombin time as measured in this study gives information which is accurate and easily obtained concerning the danger of hemorrhagic diathesis of the

newborn. The danger zone appears to be between 70 and 100 seconds, but the variability of the bleeding level is demonstrated by one case in which a microprothrombin time of more than 200 seconds was unaccompanied by pathological bleeding. In the three cases of hemorrhagic disease, coagulation times were made by the capillary tube method. The correlation with the prothrombin times is fairly good. We have not obtained a coagulation time of more than 2½ minutes in the presence of a normal microprothrombin time. It was our finding that a coagulation time of 4 or 5 minutes during the neonatal period represents a potentially dangerous prolongation.

The reduction in the incidence of retinal hemorrhages in infants of mothers receiving vitamin K is significant because of the possible relationship between retinal and intracranial bleeding. It is recognized that difficult labors and instrumental deliveries contribute to the incidence of intracranial hemorrhage¹; McKeown²⁵ has shown that the same factors affect the incidence of retinal hemorrhage. The frequency of difficult labors in our series appears to be evenly distributed throughout the treated and untreated cases. Hellman and his coworkers,¹⁸ in a carefully controlled series of cases, report a substantial reduction in intracranial hemorrhage and mortality rate in infants whose mothers were given vitamin K during labor. Sanford²⁹ and Parks and Sweet³⁰ have obtained results tending to discount the prophylactic effect of vitamin K. In our cases there were no symptoms of intracranial hemorrhage and no deaths. The extent of the protection afforded can be accurately evaluated only by observation of a larger number of cases. It would not be surprising if the incidence of hemorrhage were lower when vitamin K therapy is instituted prior to labor than when it is given during labor alone because in some of the latter cases considerable pressure may be exerted on the infant's head before administration of vitamin K.

SUMMARY

A simple test requiring only a small amount of capillary blood was utilized in making multiple determinations of prothrombin values in newborn infants. The test as described is accurate enough for practical purposes.

Treatment of expectant mothers with menadione (2-methyl-1, 4-naphthoquinone) during the last days of pregnancy or during labor virtually eliminated the hypoprothrombinemia and tendency toward pathological bleeding as a result of hemorrhagic disease which otherwise may occur during the neonatal period.

The incidence of retinal hemorrhages in the newborn was markedly reduced in infants of mothers treated with menadione during labor or prior to labor. Our results suggest that the reduction is greatest in the cases in which treatment is instituted before the onset of labor. These findings are of particular interest in their possible relationship to intracranial hemorrhage.

The introduction of formula feedings during the first few days of life counteracted hypoprothrombinemia. The mechanism of this action is still not known.

Three infants with hemorrhagic disease of the newborn were rapidly cured by administration of vitamin K.

In two cases this was administered intramuscularly, and in one case by mouth.

CONCLUSIONS

On the basis of the foregoing findings and those of others, it is considered advisable to administer vitamin K to all mothers, either during early labor, or daily during the last few weeks of pregnancy. In case this is not possible, vitamin K should be given to the infant during the first 12 hours of life, either by mouth or parenterally. If none of the above courses is feasible, supplemental formula feedings given the baby during the first two or three days will raise the prothrombin level effectively.

Treatment of hemorrhagic disease itself should consist of prompt administration of vitamin K, preferably by a parenteral route. Preparations for blood transfusion should also be made, because not all cases of hemorrhage of the newborn are due to lack of prothrombin. There are cases on record of neonatal purpura hemorrhagica due to lowered platelets. There have also been several reports of congenital lack of fibrinogen causing a bleeding tendency. Although calcium participates in the clotting mechanism, Quick does not feel that it is ever lowered sufficiently in the blood stream to impair coagulation. If blood is given, it should be administered intravenously; Lawson²⁴ has demonstrated its relative ineffectiveness when injected intramuscularly.

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Continuous Caudal Anesthesia in Obstetrics*

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MEMBERS of the Section on Anesthesia of the Mayo Clinic previously have published the technic of effecting continuous caudal anesthesia in obstetrics by injection of 1.5 per cent solution of metycaine. My colleagues of the Section on Obstetrics of the same institution wish me to report on our experience with this procedure from the standpoint of the first eighty-three patients in whose cases this method of anesthesia was employed. This number represents about 10 per cent of all patients delivered at the Clinic since the first patient was given caudal anesthesia on June 3, 1942. The solution was injected through a needle fixed in the caudal canal in nineteen cases and through an indwelling catheter in sixty-four cases.

EXPERIENCE

Completely successful. In thirty-nine cases (47 per cent), continuous caudal injection of 1.5 per cent solution of metycaine, without any other measure of anesthesia, can be judged to have been 100 per cent successful, as far as analgesia and anesthesia were concerned. Seven delivered spontaneously, nineteen were delivered with the help of outlet forceps, nine by means of low forceps and four by extraction of breech (five infants, one twin pregnancy). In seven cases the position was occipital posterior, in six of which rotation was spontaneous and in one manual rotation was effected. Thus forceps were used in twenty-eight of the thirty-five cases in which there were vertex presentations. The reasons for the use of forceps were contracted pelvic outlet in three cases, lack of progress and lack of ability of the patient to cooperate in twenty-two cases and election in three cases.

Continuous caudal anesthesia supplemented by other methods of anesthesia. In twenty-four cases (29 per cent), continuous caudal anesthesia provided excellent analgesia and anesthesia until it was discontinued for various reasons. Before these cases are considered in numerically separate groups, which will total to twenty-four, it may be said that in eleven the effect of continuous caudal anesthesia was continued into the second stage of labor for from one to two hours. Then administration

was stopped because of lack of progress either in rotation or descent of the head, or both. There were six occipital posterior positions among these eleven cases.

Now to proceed with the numerical consideration (chart 1): Of the total of twenty-four cases in which continuous caudal anesthesia was stopped for various reasons, failure of progress in the second stage of labor occurred in ten. In all these ten cases occipital posterior position occurred. In five of the ten cases rotation was effected manually, in one, by means of forceps, and in four it was spontaneous.

In nine of the twenty-four cases continuous caudal anesthesia was discontinued at the onset of the second stage of labor or very early therein. In two of these nine cases the discontinuance was because the catheter slipped and it was decided to carry on analgesia and anesthesia by inhalation rather than to reinsert the catheter. In one of the nine cases, the vertex was asynclitic and descent and rotation were arrested below the level of the spines of the ischium. Continuous caudal anesthesia was discontinued by election in three of the nine cases. In two instances of the nine, in which occipital posterior position was recognized early in the second stage of labor, continuous caudal anesthesia was discontinued because the patients had no desire to bear down; when nitrous oxide and oxygen were administered to them for analgesia, and the effect of the caudal injection had disappeared, they co-operated well. In the last case of the nine yet to be considered, the same situation that has been described in the previous sentence obtained in the presence of a breech presentation.

In four cases of the twenty-four continuous caudal anesthesia was discontinued in the first stage of labor. In two of these cases the patients were primigravidas, dilatation of whose cervixes remained at 8 to 9 cm. for five hours. Cessation of continuous caudal anesthesia was succeeded by completion of the first stage of labor and analgesia and anesthesia were effected by inhalation in the second stage, for delivery and repair. Two cases remain in this subgroup of four. One patient who was admitted in an emergency condition after many hours of hard labor had suffered from prolapse of the uterus

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†Section on Obstetrics and Gynecology, Mayo Clinic.

CHART 1

Failure of progress after 1 to 2 hours in the second stage	19
Discontinued at onset or early in the second stage	9
Catheter slipped	2
Asynclitism of vertex without progress	1
Election of obstetrician	3
No progress in cases with occipital posterior positions	2
No progress in a case with breech presentation	1
Arrest of dilatation in the first stage of labor	4
Primigravida with arrest of dilatation	2
Cervical dystocia (previous prolapse)	1
Placenta praevia after insertion of bag; no progress	1
Leaking catheter	1
	<hr/> 24

before conception. The cervix was found to be dilated 5 cm. on the patient's admission and it remained so in spite of continuous caudal anesthesia, in the course of which 90 cc. of 1.5 per cent metycaine solution were injected in four hours. At the end of that time, because of fetal and maternal indications, Dührssen's incisions were made in the cervix and delivery was accomplished with mid forceps. The second case of the two was one of marginal placenta praevia in which a bag had been inserted. Over a period of eight and a half hours 130 cc. of 1.5 per cent metycaine solution were given, with complete relief of pain but no progress in dilatation beyond 4 cm.

In one case of the twenty-four a leaking catheter led to administration of nitrous oxide and oxygen.

In this group of twenty-four patients, delivery was by mid forceps in one case, by low forceps in twelve cases, by outlet forceps in seven cases, by breech extraction in one case, and in three cases spontaneous delivery occurred.

Errors in technic and accidents to equipment in cases in which success was complete and in those in which supplementary anesthesia was employed. In these two groups—a total of sixty-three cases—it was necessary to reinsert the catheter three of fifty times in which catheters were used and a needle once of thirteen times in which needles were used. In one case a needle was broken but the fragment could be withdrawn without making an incision. In one case, when the attempt was made to withdraw the catheter after its insertion, a portion of the catheter was sheared off against the sharp edge of the needle and it was necessary to make an incision to remove the piece of catheter. In one case decubitus developed near the site of injection and persisted for several weeks. In another case a draining sinus developed but healed spontaneously weeks later.

In twelve cases hypotension occurred during or following the injection. Of the twelve patients, six received ephedrine intravenously; four of them also received fluids intravenously. In the remaining six cases the hypotension was transient and treatment was unnecessary. The patients who experienced hypotension were among those treated early in our experience with caudal anesthesia. It is our opinion that too rapid injection of the solution into the caudal canal was largely responsible for the fall in blood pressure. A marked diminution of blood pres-

TABLE I (Case 1)

Time	Treatment		Dilatation, cm.	Relief of Pain, %	Blood Pressure, mm. of mercury
	Substance, Unit, Procedure	Dose			
Between 12:30 A.M. and 11:00 A.M. next day	Pentobarbital sodium, by mouth, divided doses, total of grains	6			
4:00 P.M.		35	5	100	125/90
6:25 P.M.	Metycaine,	15	8	100	110/60
7:30 P.M.	1.5% cc.*	15	9	100	126/72
9:00 P.M.		15	Complete	100	125/70
	Total metycaine, cc.	80			
10:45 P.M.	Low forceps; episiotomy				

*No supplementary anesthesia.

sure, if it persisted for sufficient time, could exert deleterious effects on the infant through failure of circulation of blood in the maternal portion of the placenta. In one case in which hypotension occurred, marked change in the rate of the fetal heart took place. The rate returned to normal after the mother received intravenous injection of ephedrine.

The average amount of solution of metycaine administered to these sixty-three patients was 90 cc. The greatest amount was 502 cc. over a period of twenty-seven hours. Fourteen patients received 50 cc. or less.

Unsuccessful. In twenty cases (24 per cent) deficient results were obtained with continuous caudal anesthesia. In two of these cases there was some reaction to the injection and the procedure was abandoned. In two it is probable that an insufficient amount of metycaine was injected. There were eight cases in which errors in technic or accidents to equipment resulted in failure: in two, needles were broken; in one the catheter became plugged; in four cases the catheters did not remain in place, and in one, too short a needle was inserted. In each of the two cases in which the needle broke it was necessary to make an incision in order to remove the fragment. One patient of the twenty received an injection only sixteen minutes before delivery and it was necessary, for delivery, to effect anesthesia by inhalation; repair after the episiotomy, however, was performed under the anesthesia resulting from the caudal injection.

In the remaining seven cases in this group of twenty, no error in technic or equipment is known. We believe that metycaine was injected into the caudal canal but anesthesia satisfactory neither to the patient nor to the obstetrician occurred.

REPORTS OF CASES

Case 1 (Table I)—Gravida 1, para 0. In the first hours of labor satisfactory analgesia was effected by oral administration of pentobarbital sodium. Following the caudal injection completely satisfactory anesthesia was experienced by the patient. There was no desire on her part to bear down with the uterine contractions. Spontaneous delivery might have taken place if the patient had been able to co-operate. Cephalopelvic disproportion did not exist.

TABLE II (Case 2)

Time	Treatment		Dilatation, cm.	Relief of Pain, %	Blood Pressure, mm. of mercury
	Substance, Unit, Procedure	Dose			
Between 5:30 A.M. and 6:10 A.M. next day	Pentobarbital sodium, by mouth, divided doses, total of grains	4.5			
9:00 A.M.	Metycaine, 1.5% cc.*	47	4	100	135/99
10:00 A.M.		10	†	†	†
11:00 A.M.		33	4	100	50/0‡
1:10 P.M.		10	6	100	110/80
2:00 P.M.		15		100	128/95
3:25 P.M.		15	7	100	128/100
4:35 P.M.		15	7	100	108/70
5:35 P.M.		15	8	100	128/100
8:15 P.M.	15	Complete			98/60
	Total mety-caine, cc.	175			
9:31 P.M.	§Outlet forceps; episiotomy				

*No supplementary anesthesia.

†Catheter had slipped; reinserted.

‡Ephedrine 1/8 grain intravenously; solution acacia intravenously 500 cc.; pressure returned to 86/60.

§Spontaneous rotation from right occipital posterior to right occipital anterior position.

Case 2 (Table II)—*Gravida 1, para 0*. Pentobarbital sodium was used in the previous case. We have reinserted the catheter in five cases and a needle in one case with no untoward effects; nevertheless we are rather reluctant to re-enter the caudal canal. It seems reasonable to expect an increased risk of infection under such circumstances. The hypotension was sufficient in severity and duration to cause concern for the infant; consequently intravenous injection of solution of acacia was commenced. Aside from slipping of the catheter and hypotension the method was satisfactory.

Case 3 (Table III)—*Gravida 2, para 1*. The previous labor had been somewhat prolonged and had terminated by delivery with outlet forceps after episiotomy. Anesthesia was completely satisfactory. The first of twin infants presented by breech and was delivered by extraction. The second bag of waters was ruptured, following which both feet of the second infant were brought down and extraction performed. There was no perception of pain by the patient at any time. Anesthesia for more than an hour and a half resulted from injection of 30 cc. of solution.

Case 4 (Table IV)—*Gravida 5, para 3*. Previous labors had been prolonged and painful. Perhaps this labor was shortened by the caudal anesthesia. The results were satisfactory.

Case 5 (Table V)—*Gravida 1, para 0*. The lack of progress in the first two hours of the second stage of labor was no doubt due to the occipital posterior position. It is significant that no evidence of rotation occurred during this time but rotation progressed normally when pain perception was allowed to return and when the patient co-operated by bearing down under nitrous oxide and oxygen analgesia.

Case 6 (Table VI)—*Gravida 1, para 0*. This patient had carried a low blood pressure during pregnancy. There was no objective evidence of hypotension after the injection. Other patients have experienced delay in dilatation of the cervix but five hours is a considerable time for this to persist, particularly when no cephalopelvic disproportion exists. The patient's progress was normal after the injections were discontinued and supplementary anesthesia was administered.

TABLE III (Case 3)

Time	Treatment		Dilatation, cm.	Relief of Pain, %	Blood Pressure, mm. of mercury
	Substance, Unit, Procedure	Dose			
2:00 P.M.	Metycaine, 1.5% cc.*	30	4	100	120/72
Between 3:12 P.M. and 3:19 P.M.	Breech extraction of twins				
	Repair first degree laceration				

*No supplementary anesthesia.

TABLE IV (Case 4)

Time	Treatment		Dilatation, cm.	Relief of Pain, %	Blood Pressure, mm. of mercury
	Substance, Unit, Procedure	Dose			
2:30 P.M.	Pentobarbital by mouth, divided doses, total of grains	3	4		
3:00 P.M.	Metycaine, 1.5% cc.*	30		100	100/60
4:00 P.M.		20	Complete	100	100/60
	Total mety-caine, cc.	50			
4:40 P.M.	†Episiotomy				

*No supplementary anesthesia.

†Spontaneous rotation from right occipital posterior to right occipital anterior position. Delivery spontaneous.

Case 7 (Table VII)—*Gravida 1, para 0*. Insertion of the catheter and initial injection of the anesthetic agent were without incident, as were the last two injections. However, no anesthesia occurred.

Case 8—*Gravida 1, para 0*. The patient's systolic blood pressure on admission was 180 millimeters of mercury and her diastolic pressure 110. Labor was induced by rupture of the membranes under intravenous pentothal sodium anesthesia, after thirty-eight weeks of gestation. Contractions soon commenced and were of fair quality. At the beginning of labor blood pressures were 160 systolic and 110 diastolic. Relief from pain was accorded by the oral administration of pentobarbital sodium, grains 1 1/2 (0.1 gm.) at necessary intervals. When pain became severe, continuous caudal injection of 1.5 per cent mety-caine solution was started and was continued for twenty-seven hours, during which the patient received 502 cc. Contractions occurred every three to four minutes. Toward the end of effectiveness of a caudal injection, when pain perception began to return, the blood pressure rose, at times to 180 systolic and 120 diastolic. Under full effect of the caudal anesthesia the blood pressures were respectively 150 and 100. The administration of pentobarbital sodium by mouth, grains 1 1/2 (0.1 gm.) approximately every four hours seemed to lessen irritability; perhaps it enhanced the effect of the caudal anesthesia. Spontaneous delivery took place and the episiotomy incision was repaired without supplementary anesthesia.

OPINIONS

Our obstetrical experience with eighty-three patients who have received continuous caudal injection of 1.5 per cent mety-caine solution may allow of certain opinions and statements regarding the procedure.

Primiparous women who are experiencing a long first stage of labor, and multiparous women who previously

TABLE V (Case 5)

Time	Treatment		Dilatation, cm.	Relief of Pain, %	Blood Pressure, mm. of mercury
	Substance, Unit, Procedure	Dose			
Between 5:20 A.M. and 1:00 P.M.	Pentobarbital sodium, by mouth, divided doses, total of grains	6			
3:30 P.M.		35	5	100	120/80
5:00 P.M.		15	5	100	100/68
6:45 P.M.		20	5	100	100/68
9:45 P.M.	Metycaine, 1.5% cc.*	25	6	100	120/80
11:45 P.M.		25	9	100	120/80
1:00 A.M.		15	9	100	118/75
2:00 A.M.		15	Complete	100	116/74
	Total metycaïne, cc.	150			
5:30 A.M.	†Low forceps; episiotomy				

*Caudal anesthesia effective for first two hours of second stage of labor; not continued because of failure of rotation and descent. Supplementary anesthesia: nitrous oxide and oxygen while patient bearing down; ethylene and oxygen for delivery and repair.

†Spontaneous rotation from left occipital posterior to left occipital anterior position.

have experienced a long first stage, may be candidates for this form of anesthesia. The preliminary, and in some instances the associated, administration, by mouth, of pentobarbital sodium in doses of $1\frac{1}{2}$ to 3.0 grains (0.1 to 0.2 gm.) gives additional analgesia. Perhaps its use retards the return of perception of pain. In our opinion, however, if a primipara is making normal or rapid progress during the first stage, barbiturates administered orally, with the addition, if necessary, of colonic ether, are preferable to continuous caudal anesthesia. For the multipara who previously has had a short labor, we believe that these methods of relief of pain also are preferable. Naturally nitrous oxide and oxygen are administered intermittently to these patients during the second stage of labor. During the delivery and for repair of the episiotomy ethylene and oxygen are administered.

In some of our cases it would seem that the first stage of labor was prolonged after continuous caudal anesthesia was instituted and in others it appeared to be shortened, but impressions in this respect have not much value because of the great variation in this stage of labor under all circumstances. The second stage is no doubt prolonged when continuous caudal anesthesia is employed.

The percentage of occipital posterior positions has been greatly increased in our experience. Seven occipital posterior positions occurred in the thirty-nine cases in which continuous caudal anesthesia was the only method used and ten occurred in the twenty-four cases in which this form of anesthesia was abandoned for various reasons. Thus, seventeen of fifty-eight vertex presentations (29 per cent), as compared to our average of 13 per cent, were complicated by occipital posterior positions. Of these seventeen cases, in ten rotation was spontaneous; in six, it was effected manually and in one it was aided by

TABLE VI (Case 6)

Time	Treatment		Dilatation, cm.	Relief of Pain, %	Blood Pressure, mm. of mercury
	Substance, Unit, Procedure	Dose			
10:00 A.M.	Pentobarbital sodium, by mouth, grains	3	3		
11:00 A.M.		30	3	100	94/40
12:30 P.M.		20	5	100	100/63
2:30 P.M.		20	9	100	100/60
3:15 P.M.		20	9	100	100/60
4:20 P.M.	Metycaine, 1.5% cc.*	20	9	100	106/54
5:20 P.M.		20	9	100	104/66
6:20 P.M.		20	9	100	92/50
7:20 P.M.		20	9	100	110/60
9:30 P.M.			Complete		
	Total metycaïne, cc.	170			
10:10 P.M.	†Low forceps; episiotomy				

*Supplementary anesthesia: nitrous oxide and oxygen while patient bearing down; ethylene and oxygen for delivery and repair.

†Delivery was from right occipital anterior position.

TABLE VII (Case 7)

Time, P.M.	Metycaine, 1.5% cc.	Dilatation, cm.	Relief of Pain	Blood Pressure, mm. of mercury
7:40	30	5	None	148/92
8:10	8*	6	None	158/100
8:20		6	None	150/92
8:45	20	6	None	142/90
9:20	20	6		145/70

*Vertigo and blurring of vision.

means of forceps. In part, this high incidence of occipital posterior positions can be explained by the inability of the patient to bear down, which in turn results from loss of pain perception and of the perineal reflex. In part also, the unusual percentage of occipital posterior positions may be attributable to loss of muscle tone of the pelvic gutter. We believe that an increased number of occipital posterior positions will be noted generally when continuous caudal anesthesia is employed. One reason for this is that this form of anesthesia will be selected for women who are experiencing a prolonged labor, for among such women the occipital posterior position may be more often encountered than among others. Perhaps the position of the presenting part is more easily recognized at the time of rectal examination owing to the complete perineal relaxation when continuous caudal anesthesia is employed and, therefore, perhaps the increased incidence of occipital posterior positions is more apparent than real. In our series, forceps delivery occurred forty-eight times in fifty-eight vertex presentations, 82 per cent. Our usual incidence of forceps deliveries is 26 per cent. A mid forceps operation was performed once; low forceps were applied twenty times and outlet forceps were

employed twenty-six times. This increase naturally is due to loss of the perineal reflex and lack of pain perception resulting in the patient's being unable to co-operate. The high incidence of occipital posterior presentations influenced the number of forceps deliveries. In six cases cephalopelvic disproportion was an added reason for application of forceps. The difficulty of delivery by forceps, other than that by outlet forceps, may be increased when continuous caudal anesthesia is used. This is owing to failure of the patient to co-operate when a uterine contraction is present. Thus more traction by the obstetrician is necessary.

We have used this form of anesthesia in cases of toxemia and have demonstrated considerable lowering of blood pressure. To these patients the risk of delivery is increased and they do not tolerate pain well. The blood pressure of one patient suffering from toxemia remained at 150 millimeters of mercury systolic when anesthesia was complete. Just before another injection became necessary, when pain perception returned, the blood pressure would rise to 180 systolic and 110 diastolic.

In all cases readings of blood pressure should be made before and after injection. Significant falls in blood pressure have occurred. The response to intravenous injection of $\frac{1}{8}$ to $\frac{3}{8}$ grain (0.008 to 0.024 gm.) of ephedrine, and in two cases to the injection of solution of acacia, has restored the pressure. To patients who enter labor with hypertension and toxemia, if hypotension follows the injection, we prefer to give $\frac{1}{8}$ grain of ephedrine and repeat the dose if necessary rather than to give an initial dose of $\frac{3}{8}$ grain.

Because of the complete relaxation of the perineum following caudal injection, extraction of the aftercoming head in breech delivery is facilitated. Other operative procedures, such as Dührssen's incisions, repair of the perineum and repair of the cervix are effectively accomplished. These may be rendered possible even when analgesia against the pain of uterine contraction has not occurred.

Two other matters, although unrelated, deserve mention here before turning to broader discussion of the subject. It has been stated that this form of anesthesia should not be used when placenta praevia is present but in two such cases we had no untoward effect from its use. The bladder must be watched. Patients to whom continuous caudal anesthesia is administered lose the bladder reflex and may be unable to void. Catheterization is to be performed whenever necessary.

Anesthesia of a limited area of the body has advantages over general anesthesia that are well known. In obstetrics, these advantages apply to the infant as well as to the mother. The mother is able to take food and fluid and this, together with freedom from pain, allows her to arrive in the delivery room in better condition than otherwise would be hers. The infant is not affected as it

is when drugs and anesthetic agents having general action are given.

Technical difficulties and risks peculiar to the method have been mentioned previously. There will be a percentage of failures even in the hands of an experienced and skillful anesthetist. One not trained in anesthesia, or one who does not have the facilities to meet all possible complications, should not employ this procedure.

When continuous caudal anesthesia (or any method for relief of pain for that matter) is administered to a patient in labor, additional responsibilities and additional numbers of observations immediately become necessary for the obstetrician. In the continuous caudal method, the injection must be repeated at varying intervals and, after each injection has been made, the pulse rate and blood pressure must be recorded, the progress of labor must be noted and evidences of untoward general effects must be sought. The progress of labor must be more carefully noted when continuous caudal anesthesia is used than when other methods are employed. The reason for this is that the patient is no longer able to judge the severity of pain or to perceive symptoms that may be significant, such as tonic contractions or changes in the character of the pain. Nothing announces the advent of the second stage except the results of rectal examination. As a result, much more time must be spent with the patient than is usual.

There is no doubt that when anesthesia produced by continuous injection of 1.5 per cent metycaine solution is completely effective, and when labor progresses normally through the first and second stages, the patient and the obstetrician are impressed with the results. When a deficient or completely unsatisfactory result obtains, however, one realizes that a panacea for relief of the pain of labor has not yet been devised. Other methods of relief of pain during labor have given satisfactory results. The technics of their administration are more easily performed and the possible complications are less serious to the patient. Consequently, we believe they still will continue to serve a useful purpose and that their use should be continued.

Finally, in some cases labor no doubt would progress more nearly normally without analgesia and perhaps without anesthesia. In other cases labor is benefited by measures for relief of pain. Analgesia cannot be applied in obstetrical practice without considering that frequently the drugs used for relief of pain will affect the progress of labor. There can be deleterious effects on mother and fetus. We do not, of course, recommend the practice of obstetrics without analgesia and anesthesia. However, the patient, her husband and the obstetrician who consider labor solely from the aspect of relief of pain will incur an increased risk to mother and infant unless sound obstetric judgment is employed in selecting and applying the method of analgesia.

The Laboratory of the Physician and the Small Hospital*

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DURING the past few decades, as a part of the increased store of knowledge of disease, there has been a great increase in the number of laboratory tests. The use of such tests has become as important a part of the practice of medicine as the use of the stethoscope. In fact it happens sometimes that clinicians will rely more on a series of chemical analyses than on a careful history and physical examination. Laboratory tests cannot supplant these older, time-tried diagnostic methods, but they can be and are an increasingly valuable supplement to them.

There are available to the physician a bewildering number of procedures, some of which are quite applicable to clinical medicine, while others belong more properly in the realm of the research student or experimental investigator. Of the former, the practitioner will wish to use only those which will be helpful in his daily work and which may be done with whatever limited facilities may be available. He will, in fact, look for a maximum of information with the expenditure of a minimum of effort. Actually, I think it is true that most physicians in practice will not or cannot do anything more than the simplest of procedures. Hence, whenever possible, routine laboratory work should be delegated to a technician who will devote the required amount of time and patience to the task. Needless to say, the better trained the technician, the better the results will be, but it is quite possible to train the average office assistant to perform many routine laboratory procedures in a competent manner. Just what should be attempted in the office or small hospital will naturally depend on the equipment available and the training and ability of doctor or technician. It would be of small value to carry out complicated technical maneuvers which would only rarely be apropos and the proper interpretation of which might present some difficulty.

In the small office there is little room, and time is always at a premium. If laboratory work is to be done, then, it must be possible to do it quickly, conveniently and without undue muss. It is, therefore, important that a small room or part of a room be set aside for this purpose, preferably where the office assistant may also be able to attend to other duties. One should have a proper table, a sink and a source of heat, either gas or an alcohol lamp. An absolute minimum of necessary equipment would include a microscope, test tubes, centrifuge and hemocytometer, together with reagents and stains.

One needs Fehling's, Benedict's or similar solution and 10 per cent acetic acid for general urinalysis. Stains used will vary with the individual, but methylene blue, gentian violet, Wright's or Giemsa and material used in Gram's stain and that for acid-fast bacilli should be available.

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With the above as a minimum, the laboratory may be built up to any desired level, adding either the small individual test outfits, such as those supplied by La Motte Chemical Company and by the various drug houses or a colorimeter and necessary reagents and glassware. A useful adjunct is an incubator, which need not be elaborate; a small wooden box with a light bulb in it makes an incubator.

It is not for me to tell any of you what laboratory work you should or should not do, but I would like to draw your attention to a number of procedures, all of which can be done either in the office or in a small hospital laboratory. Technical instructions, readily available in standard text books, have been omitted except in a few instances. Rather, I have gathered a series of more or less related bits of information, some of which I hope may be of interest.

URINALYSIS

In addition to the customary general examination for acidity, specific gravity, albumen, sugar, and microscopic for blood, pus, casts and crystals, there are a few less commonly used procedures to be mentioned. Quantitative estimation of the output of sugar is a necessity in treating diabetes. If one does not wish to make the complete determination, a rough estimate may be obtained by comparing the color of the reduced copper solution with a color chart. A light green color is produced by $\frac{1}{4}$ to $\frac{1}{2}$ per cent of sugar, dark green by 1 per cent and so on through yellow, brown and red. One should test for diacetic acid and acetone during care of diabetes and whenever acidosis is present or suspected.

When using acidifying agents in treatment of urinary infections, the pH may be determined by treated paper, such as nitrazine, and comparison with a standard color chart.

Relatively simple tests for the presence of bile and to show an increase in urobilinogen are available. Urobilinogen is increased in hemolytic jaundice and liver failure and decreased in obstructive jaundice.

Rarely, one may wish to examine for Bence-Jones Protein and occasionally demonstrate blood by the benzenidine test. The kidney function tests most applicable to the small laboratory are the Mosenthal test, in which the specific gravity of the total night specimen and of two hourly day specimens is estimated; and the PSP test in which a given amount of phenolsulphonphthalien is injected and the amount excreted in a given time measured. A low fixed specific gravity and a diminution in the excretion of PSP indicates impaired kidney function. Fifteen to twenty gm. of chlorides are normally secreted in the urine every twenty-four hours. In conditions in which there is a marked loss of chloride with a corresponding drop in blood chlorides, there will be a fall in

urinary chlorides. A simple, if somewhat inaccurate, test is to add a few drops of 12 per cent silver nitrate to the urine previously acidified with nitric acid, which throws down a white curd like precipitate of chlorides. If the urine becomes only whitish or opalescent, it indicates marked diminution of chlorides. Of course, a complete quantitative examination can always be made.

Bilirubin. The presence of an excess of bilirubin in the urine may be demonstrated by several simple tests and gives approximately the same information as may be obtained by the van den Bergh test on the blood.

GASTRIC ANALYSIS

Examination of the stomach contents constitutes one of our earliest laboratory procedures and one which has to a certain extent been supplanted by the fuller use of roentgenological methods. However, x-ray visualization demonstrates structural changes and muscular ability, whereas to gain information as to the stomach's functional capacity requires an analysis of its contents. Admittedly, collection of the specimen is a messy and bothersome procedure and one which few physicians will carry out themselves except under extreme provocation. This is certainly one test that will be done much more often if it can be delegated to a laboratory or office assistant. Two standard methods of stimulating the stomach to secrete are available, the use of the test meal either of food, water or alcohol and the injection of histamine. The injection of $\frac{1}{2}$ to 1 cc. of 1:1000 histamine is the most efficient method of inducing the gastric glands to secrete acid, but it has the disadvantage of producing undesirable side reactions frequently. In any case, the use of a test meal is probably sufficiently accurate for ordinary clinical work.

Minor variations in gastric acidity are usually not important but a persistently high acidity when associated with an ulcer must be considered in the clinical picture, especially when surgery is contemplated. Complete achlorhydria is in many respects a more significant finding, as it occurs as a feature in carcinoma of the stomach, pernicious anemia, the Plummer Vinson syndrome, in chronic atrophic gastritis and occasionally as an isolated finding. The contents should be examined microscopically for blood, pus, and debris, as well as for occult blood by the benzidin test. I think we all do too few gastric analyses and I think we do not do them because it is a moderately disagreeable procedure for the patient and for the collector of the specimen.

FECES

For a number of reasons examinations of feces are seldom carried out in the office or small laboratory. Collection of the specimen is somewhat of a nuisance as is the specimen after it has been collected. Then, too, the information to be obtained is often relatively meagre. However, often enough a gross examination noting the color, form, consistency, the presence of mucus, gross blood or pus, and a microscopic examination for blood and pus will yield useful information. Demonstration of specific organisms such as typhoid is a procedure for the larger laboratory, but occasionally one may wish to search for *amoeba histolytica*, when it is of advantage to add a little iodine to the wet smear.

Demonstration of occult blood in the stool by the benzidin or guaiac test is a simple and useful procedure when bleeding in the gastrointestinal tract, as from a peptic ulcer, is suspected. The test is very sensitive and it is necessary that no meat be ingested for three days prior to securing the specimen.

HEMATOLOGY

In the study of hematology, one can probably secure more valuable information with less equipment than in most other fields. One needs a microscope, hemoglobin scale, hemocytometer, glass slides, 1 per cent acetic acid, Hayem's solution and Wright's or Giemsa stain, for the more common procedures. A hematocrit, sedimentation tube, centrifuge, accurate hemoglobinometer, and material for the peroxidase stain will be useful and simple additions.

Leukocyte counts are the most common of all examinations of the blood, and their usefulness is well known. It is well not to attach too great importance to minor variations in the count as the margin of error is relatively large. However, any significant change from the normal of 5000 to 8000 per cmm. of blood generally indicates the presence of disease. Frequent leukocyte counts are a necessity during the course of sulfonamide therapy, a significant drop being a sign of toxic effects. Commonly, counts are to be made as an aid to diagnosis in the acute infections, notably appendicitis, where elevation of the count gives some indication as to the severity of the infection. An early rise in white cells in whooping cough is a diagnostic help before the onset of the whoop. In a patient with sore throat, especially one which does not clear up readily, always make a count, as there is always the possibility of agranulocytosis or leukemia. Also, we must bear in mind that in the early stages of leukemias the total count may be normal, although the differential may show characteristic changes.

Red cell enumerations are an essential part of the study of any anemia. Except for polycythemia, changes in the number of red cells are in a downward direction and indicate the presence of anemia. Any significant lowering of the red cell count below normal points to an anemia but does not indicate the type of the anemia. This is to be determined by the general nature of the case and further blood studies. Hemoglobin may be determined with the Tallquist scale, which is a commonly used, if somewhat inaccurate, method of estimation. It has, however, the great virtue of accessibility and simplicity and probably, for most clinical purposes, is accurate enough. The Sahli and Dare hemoglobinometers are somewhat better, and best of all is the method of estimating the number of grams per cent, normally 14 to 15. This requires a colorimeter or a special apparatus, such as that made by La Motte. In secondary anemias, there is a fall in hemoglobin often greater than the drop in the red cells, whereas, when the anemia is primary, there is a greater drop in the cell count than in the hemoglobin.

The color index, found by dividing twice the first two numbers of the red cell count into the hemoglobin percentage, is below one in secondary anemias and above unity in primary anemias.

Blood smears are the next step in blood study and from them one can study the size, shape and staining characteristic of the cells. In the case of the red cells, except when nucleated red cells are present, this is all the information obtained from a smear stained with Wright's or Giemsa stain. To show reticulocytes, which are intermediate stages in the development of erythrocytes, requires special, but simple staining with vital dyes such as cresyl blue. A rapid increase in reticulocytes is the initial response to adequate liver therapy in pernicious anemia. In the ordinary stained smear, complete study of the white cells is possible. Customarily, the percentage of polymorphonuclears, large and small lymphocytes and the mononuclears is estimated, this constituting a differential count. The presence and type of any immature cells present are noted and a percentage count may be made. During the course of acute infections, diagnostic and prognostic information of value can be secured by the Schilling method of estimating the numbers of immature cells of the granular or polymorphonuclear series, at various stages from myeloblast to mature cell. An increased percentage of immature cells is spoken of as a shift to the left, and the higher the percentage the more severe the infection. During the progress of the disease, an increase in the percentage of immature forms is a bad omen, whereas a decrease points towards recovery. The presence of a high percentage of immature white cells is the characteristic feature in leukemias, and the increase may be of either the myelocytic or lymphocytic series.

The special peroxidase stain, using prepared Goodpasture stain with hydrogen peroxide added to the water used for dilution, will aid in the differentiation between the two series, those of the myelocytic series, except the myeloblast, showing deep blue or black granules. This stain is of value in differentiating between the more common and non-fatal disease, infectious mononucleosis, and the leukemias. Clinically, it is of the utmost importance to be able to make this distinction. There are available in text books charts of blood smears giving the general appearance of stained cells. Unfortunately, sometimes the cells one sees under the microscope often do not seem to look like those in the pretty pictures, and those of us with limited experience may not always be able to properly identify all the cells seen. Hence we may need, on occasion, to be cautious in the conclusions derived from the study of a blood smear.

The sedimentation rate is a simple procedure requiring only a suitable tube and rack. Normally the red cells in a standard Westergren tube settle 1 to 3 mm. in an hour if the blood is from a male, and 4 to 7 mm. per hour if from a female. In general, an increased sedimentation rate indicates the presence of active disease in the body.

In the past few years, estimation of the volume of packed red cells using the hematocrit tube and a high speed centrifuge has come into more common use. Normally the red cells occupy the lower half of the tube, a cell volume of 40 to 50 being decreased in anemias. The volume index may be calculated by dividing the number of red cells expressed as percentage of normal into the volume of the red cells (read from hematocrit)

also expressed as percentage. This is above one in primary anemias and below one in secondary anemias.

In the study of hemorrhagic conditions or as a means of demonstrating their presence, estimation of the coagulation and bleeding times are old, valuable, and easily performed tests. Especially are these to be recommended as pre-tonsillectomy precautions. The blood coagulation time, normally 2 to 10 minutes, is increased in jaundice, leukemias, and some anemias and is markedly prolonged in hemophilia. The bleeding time, normally 1 to 3 minutes, does not parallel the clotting time. It is increased in purpura hemorrhagica, in hemorrhagic disease of the newborn, but is normal in hemophilia. In differentiating between the latter two diseases, a study of clot retractility may help.

Recent knowledge of the role of vitamin K, especially in conditions associated with jaundice and in hemorrhages in the newborn emphasize the value of estimating the prothrombin clotting time, expressed as percentage of normal, or as in time in seconds. The Abbott Laboratories supply a compact outfit for this test. An increase in the prothrombin time, normally about 35 seconds or 80 to 100 per cent, generally points to a lack of vitamin K, either because of insufficient ingestion or, more usually, failure of absorption or inability of the liver to use it after absorption.

BLOOD TRANSFUSION

There are few hospitals, however small, that will not wish to be prepared to give their patients the benefit of a transfusion when necessary. Hence facilities for blood typing and cross-matching need to be available. For typing, all that is necessary is specific type sera obtainable from supply houses. However, it is to be noted that merely typing will not be sufficient. If dangerous and often fatal transfusion reactions due to incompatible blood are to be avoided, careful cross-matching must be done. Ordinary cross-matching, in which a drop of donor's cells and patient's serum and possibly patient's cells and donor's serum are mixed and observed for a half hour for agglutination, will not always pick up weak reactions due to M, N and RH factors. Nor will they show the presence of hemolysins. Hence a method such as that given by Cameron¹ or the following method of Levine is safer.

The Levine Method: Into a small test tube put 1 drop of 2 per cent suspension of donor's cells, 2 drops of patient's serum, shake, incubate at 37° C. for 30 minutes. Centrifuge very slowly for one minute. Shake, examine grossly and microscopically. A second tube with donor's serum and patient's cells may be set up. It is stated that this method will demonstrate any incompatibilities.

The question of serologic tests for syphilis in connection with transfusions requires consideration. Ordinarily, the doctor or small hospital will be content to send their patients' blood to the state laboratory for serological testing. However, time will rarely permit of this procedure in the case of a blood donor and it becomes necessary for them to utilize a satisfactory test. Simple flocculation tests such as the Kahn, the method of Lieboff and that developed by Mazzini are now available. While the incidence of syphilis in North Dakota is very low,

and the chances of having no bad results with a transfusion from an untested donor are very good, this practice cannot be recommended.

BLOOD CHEMISTRY

Accurate estimation of many of the chemical constituents of the blood is becoming increasingly common. While in the larger clinics and hospitals many of these studies are made routinely, the average practitioner will feel it necessary to use them somewhat less frequently and will probably not wish to do them in the office. The amount of equipment needed is, however, not great and certainly the small hospital should undertake the more commonly used blood chemistry determinations. They will need a colorimeter, either of the Dubosque type or the newer photoelectric model, and an assortment of reagents and glassware. If desired, one may use small individual test outfits such as those supplied by the La Motte Chemical Company. They are somewhat more simple and are most suitable where only a few procedures are being used.

Estimations of the non-protein nitrogen and the blood urea nitrogen usually give similar information as to retention of nitrogenous products due to impaired kidney function associated with kidney disease, urinary obstruction, circulatory failure, or dehydration as in fever, intestinal obstruction and prolonged vomiting. As estimation of the blood urea N is much easier to do, it will usually suffice. However, it is to be noted that, according to Meyer,² during medical or surgical jaundice the N.P.N. is increased from its usual level of 25 to 40 mgm. per cent and the blood urea lowered from a normal of 10 to 15 mgm. per cent. He states that the higher the N.P.N., the graver the prognosis.

The total protein of 6 to 8 gm. per cent and serum albumen serum globulin ratio are probably of little present interest to us but may become so, if and when the intravenous injection of amino acids comes into common use.

Blood uric acid, normally 2 to 4 mgm. per cent, is increased in gout and early renal insufficiency.

Blood sugar, normally 80 to 120 mgm. per cent, is increased during diabetes and estimations will be made frequently during the course of treatment. As a diagnostic measure, the sugar tolerance test will be a help in differentiating diabetes mellitus from renal glycosuria and as an indication of the presence of hyperinsulinism. It may also be used as a liver function test. Following the ingestion of 100 mg. of glucose in the normal individual, there is a rapid rise in the blood sugar with a return to normal in two or three hours and no sugar appearing in the urine.

Estimation of the carbon dioxide combining power of the plasma is the most reliable indicator of the presence and degree of acidosis or alkalosis. Normally 55 to 75 volumes per cent, it goes above 75 when alkalosis is present and below 50 in acidosis. Anything below 30 points to a severe acidotic state. Unfortunately, the method is tedious and requires special apparatus.

Blood chlorides are increased when renal output is insufficient and decreased whenever large amounts of chlorides are being lost, as in vomiting, diarrhea and

sweating. Four hundred fifty to five hundred mgm. per cent is found in whole blood and 560 to 630 mgm. per cent in plasma or serum. A rough estimate of the state of blood chlorides may be obtained by a simple test of the amount excreted in the urine, as previously mentioned. Estimation of other blood constituents such as creatine and creatinine, calcium, phosphorus, phosphatase and cholesterol are technically difficult and their field of usefulness is somewhat limited, so that the small laboratory will probably not find it advisable to do them.

SULFONAMIDE LEVELS

It is a common observation that identical doses of a sulfonamide drug will produce different blood levels in different persons. Hence, if one is to make the most intelligent use of these agents, and avoid at least those reactions caused by overdosage, frequent estimations of the blood levels must be made. Blood concentration should be maintained at optimum levels of 8 to 10 mgm. per cent for sulfanilamide, 5 to 10 for sulfapyridine, 5 to 7 for sulfathiazole and 8 to 15 for sulfadiazine. Estimations can be made with the ordinary colorimeter or, again, individual test kits for each drug are available.

CEREBROSPINAL FLUID

Fluid removed by lumbar puncture ordinarily is colorless. It may be stained by old or fresh blood; if the latter, it is probably a technical error and if the former there has been hemorrhage into the subarachnoid space. Yellowish or xanthochromatic fluid occurs when there is compression of the spinal cord. Fluid derived from a case of acute meningitis or tuberculous meningitis may form a pellicle on standing. An increased amount of globulin as demonstrated by Pandy's or other test is always present if there are other abnormal findings, so should be the first test done. In all acute and many chronic diseases of the meninges and central nervous system, there will be more than the usual 2 to 5 cells per cubic millimeter, with the higher cell counts in the more acute diseases. Polymorphs will be most prevalent in the acute infections of the meninges, whereas, in more chronic meningitis, poliomyelitis and epidemic encephalomyelitis, there will be a preponderance of lymphocytes. Bacteriological examination by stained smear and culture will be of most value in acute meningitis and the identification of specific organisms will point the way towards proper therapy.

BACTERIOLOGY

The possession of a microscope, a few stains, glass slides and some sort of incubator, if combined with a general knowledge of the more common pathogenic organisms, opens up a wide and useful field. All abnormal body discharges may be examined, either unstained, as a direct stained smear, or as a stained smear after culture in an incubator. The method employed depends on the type of organism sought for. Direct smears may be made from any discharge and give some immediate information, whereas cultures will make it easier to find the organisms, because there will be so many more of them. Some bacteria, such as staphylococcus, diphtheria bacilli and streptococcus, are easy to culture, whereas others, such as gonococci and tubercle bacilli, require more complicated methods not ordinarily available. In examining for the gram-negative, intracellular diplococcus which

tends to run rampant in the urethra and adjacent paths, direct smears stained by Gram's method or by methylene blue are used. Sputum examinations for the presence of *Mycobacterium tuberculosis* are quite feasible and identification of the red stained rods not too difficult. It is hardly necessary to point out the advantages accruing to one able to identify diphtheria bacilli from smear or culture, or gonococci from a smear.

In the diagnosis and treatment of infections of the urinary tract, demonstration of the organism is of more importance now that we have several different drugs to choose from, each being most effective against certain bacteria.

Fungi and motile organisms may be seen in unstained, wet preparations. In looking for ringworm and other fungi affecting the skin, scales should be soaked in potassium hydroxide. Actinomyces, yeast cells, and trichomonads may be seen after mixing a drop of pus with normal saline on a slide. When looking for trichomonads, or in fact any organism whose identification depends on its motility, one must use great care in collecting the specimen. It should be collected fresh, before it has come in contact with any foreign material, immediately transferred to warmed saline and examined at once. Trichomonads are most easily seen when they are motile, although, with experience, they can be identified by their size and shape. One may progress further into the realms of bacteriology or be content with a few simple procedures such as I have so briefly mentioned. In either case he will be well repaid for the effort expended, either in the direct clinical information secured or in the scientific knowledge imparted to himself.

LIVER FUNCTION TESTS AND JAUNDICE

For many years clinicians have been searching for a reliable liver function test without as yet unearthing one that is entirely satisfactory. This is readily understandable when one remembers that the liver has so many functions and that relatively little exact information is available about many of them. It seems likely, then, that as our knowledge increases we will also have new tests added to the many presently available. The dye tests and the hippuric acid test are commonly used to indicate the excretory ability of the liver. The dyes used are bromsulfalein, rose bengal and sodium tetraiodophenolphthalein. In using bromsulfalein, rose bengal or similar dyes, a measured amount is injected and the dye retained in the blood after a given time is estimated. With a good liver all but 5 to 15 per cent will have disappeared. Quick's hippuric acid test is a relatively simple procedure, based on the fact that hippuric acid, synthesized in the liver from benzoic acid and amino acetic acid, is normally excreted in the urine at a constant rate. After giving a weighed amount of benzoic acid the amount of hippuric acid in the urine is estimated. An excretion equivalent to 3 gm. of benzoic acid in four hours is considered normal; less than this points to impaired liver function. The galactose tolerance test, relatively easy to do, determines the ability of the liver to utilize carbohydrates. Ordinarily, following ingestion of 40 grams of galactose, less than 1 gram is excreted in the urine. In the presence of obstructive jaundice less than 3 grams is excreted, whereas in liver failure larger amounts are put out.

Jaundice may appear as a result of excessive blood destruction, intrinsic liver disease or obstruction of the bile ducts, and various laboratory procedures are available to aid in the differentiation between them and in the diagnosis of the actual condition within the main group. The icteric index, in which the blood serum is compared to an arbitrary standard of 1:10,000 potassium dichromate solution will tell us only the extent of the jaundice. Estimation of the serum bilirubin will do the same with more accuracy.

Then we have the van den Bergh test in which the reaction of Ehrlich's diazo reagent varies with the type of bilirubin present. If the bilirubin has gone through the liver and been reabsorbed, there is an immediate characteristic color change, the so-called direct reaction, which indicates that the jaundice is obstructive. If the serum bilirubin is preformed, that is, has not been through the liver, the color reaction is delayed for about thirty minutes. This is the delayed direct reaction as found in hemolytic jaundice. A combination of these two reactions is spoken of as a biphasic reaction and when this occurs, there is an element of both obstructive and hemolytic jaundice as may occur in acholuric familial jaundice associated with gallstones. Some writers (Whipple⁴), refer to the delayed direct reaction as the indirect reaction, whereas Gradwol³ describes the indirect reaction as a quantitative estimation of the serum bilirubin. Many clinicians now feel that the van den Bergh test is of little value and Whipple states that urine examination for presence of bilirubin gives the same information and is much simpler.

A glucose tolerance test is said to show a return of blood sugar to normal in two hours if the jaundice is of toxic or hemolytic origin and to be initially high and fail to return to normal in two hours if the jaundice is obstructive.

The prothrombin clotting time of the plasma should be estimated in all cases with jaundice and, when low, vitamin K administered. Lord and Andrus⁵ found that in obstructive jaundice there was an increase of from 10 to 60 per cent in the plasma prothrombin time following injections of synthetic vitamin K, whereas in intrahepatic jaundice the rise was never more than 10 per cent.

Urobilinogen, formed in the gastrointestinal tract, is partially reabsorbed, carried back to the liver and reconverted to bilirubin, the remainder being excreted as urobilinogen in the urine. An increase in the urinary output occurs as a result of liver damage or excessive blood destruction. There is a marked decrease of output in total obstruction of the bile duct, while it may be normal or increased if the obstruction is only partial.

Estimation of the alkaline serum phosphatase, use of the Hanger cephalin flocculation test and other procedures have been found useful, but, in general, in the small laboratory it will be better to develop and use a few simple tests with which the technician and the doctor are familiar.

The use of laboratory procedures will be of value, not only as a direct means of securing diagnostic or other information necessary for the care of any given case, but to increase the knowledge of the doctor and add to his scientific stature. For, in order to use the laboratory

intelligently and properly interpret the results obtained, he must have or secure a good knowledge of that particular disease. In the ordinary course of practice there is always a tendency to follow a routine which as years go by becomes more or less fixed and the more one gets fixed in a routine the less interesting becomes the practice of medicine. Hence, to change one's procedures or develop a new test requires reappraisal of the disease in question, a restudy which often turns up new information or old information long forgotten. All this is a

mental stimulation adding interest and excitement to what may have become merely tiresome work. Let me commend the laboratory to you for this purpose.

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Gastric Resection in the Treatment of Gastro-Jejuno-Colic Fistula

Report of 3 Cases

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ONE of the most serious complications of gastro-enterostomy is the formation of a jejunal ulcer which penetrates into the colon, resulting in a gastro-jejuno-colic fistula. In 1899, eighteen years after Wolfer⁴⁰ performed the first gastro-enterostomy, Braun⁴¹ reported a case with an anastomotic ulcer. In 1902, Czerny¹⁰ operated upon a 36-year-old man who had a gastro-jejuno-colic fistula. The patient recovered after a one-stage block resection of the stomach, jejunum, and colon. Between 1902 and 1934, Lahey and Swinton²² estimate that approximately 2,100 cases of jejunal ulcer complicating gastro-enteric anastomosis had been reported. However, Thomas³⁵ in 1940 was able to find only 343 cases of gastro-jejuno-colic fistula, 203 of which occurred after gastro-enterostomy. Considering both the mechanical complexity of this disease in addition to the grave physical state of these patients, it is not surprising that one finds a great many surgical procedures advocated in the treatment of this condition. Regardless of the type of surgery, the mortality in the past has been very high, varying from 20 to 63 per cent, or an average of 34.9 per cent.³² Recent reports, however, show that with proper preliminary care, this figure should be reduced considerably.

INCIDENCE

Recently, Portis,³² in an extensive review of the literature, found that the incidence of jejunal ulcer following gastro-enterostomy for duodenal ulcer, varies from 1.4 to 34 per cent or an average of 8.9 per cent. Following gastric resection, however, this incidence is found to vary from .5 to 10 per cent, or an average of 3.8 per cent (Table I). Gastro-jejunal ulcer occasionally follows anastomosis for gastric ulcer and almost never follows anastomosis for carcinoma. The incidence seems to parallel the degree of gastric acidity. Fifteen per cent of all jejunal ulcers penetrate into the colon, forming so-called

gastro-jejuno-colic fistula. With the advent of gastric resection in the treatment of duodenal and jejunal ulceration, and the proper use of gastro-enterostomy, these figures will surely be improved upon in the future. Gastro-colic fistula also follows advanced cases of carcinoma of the colon and stomach. Verbrugge³⁶ in 1925 found in the literature 24 instances where a large benign gastric ulcer penetrated directly into the colon. In addition, he found 1 case thought to be congenital, 3 the result of trauma, 6 due to advanced tuberculosis, and 1 due to perforation of a subphrenic abscess. Barger³ recently reported a case complicating chronic ulcerative colitis. In this paper we are chiefly concerned only with those following gastro-intestinal surgery.

While the ratio of men to women is three to one in the case of duodenal ulcer, and nine to one in the case of jejunal ulcer, only once or twice has gastro-jejuno-colic fistula been found in the female. The condition may occur at any age; it is usually seen in people between 40 and 60.

TABLE I³²

Summary of a statistical review by Portis showing the incidence and mortality rates of gastro-jejuno-colic fistula as compared to jejunal and duodenal ulcer.

	No. of authors reviewed	High	Low	Average
Incidence of gastro-jejunal ulcer following gastro-enterostomy	25	34%	1.4%	8.9%
Incidence of gastro-jejunal ulcer following gastric resection	9	10%	.5%	3.8%
Incidence of gastro-jejuno-colic fistula following jejunal ulcer	12	23%	8.2%	14.1%
Mortality following conservative operations for peptic ulcer	13	9%	.1%	3.52%
Mortality following radical operations for peptic ulcer	31	19%	1.6%	6.7%
Mortality following secondary operations for jejunal ulcer	13	33%	4%	18.5%
Mortality following secondary operations for gastro-jejuno-colic fistula	7	63%	20%	34.9%

SYMPTOMS

These patients usually give a history of a gastro-enterostomy performed for duodenal ulcer, followed by a recurrence of pain as a result of the formation of a

*Presented at sixty-fifth annual scientific session of the Montana State Medical Association at Billings, July 8, 1943.

jejunal ulceration. This pain is usually located to the left of the umbilicus and is not easily controlled with antacids. The pain usually persists in spite of medical management. When the jejunal ulcer finally perforates into the colon, the pain is often relieved and the classical picture of a gastro-jejuno-colic shunt develops. Diarrhea was observed in 39 of 40 patients studied by Atwater, Butt, and Priestly.² The stools are spoken of as being loose, watery, light yellow and greasy. Occasionally they are described as infantile or lienteric. Fecal vomiting and fecal taste in the mouth is common. Grey and Sharpe¹⁹ report a case in which the patient, on attempting to light a cigarette, belched blue flame. Thirty per cent of the patients give a history of hemorrhage at some time or other. The patients gradually lose weight and strength, become dehydrated, develop nutritional edema, vitamin deficiencies, disturbances in their blood chemistry and finally die of inanition, sepsis, hemorrhage or intercurrent infection. Butt, Atwater and Priestly,² in a study of 40 patients found the following:

Diarrhea	39 cases
Weight loss	31 "
Loss of strength	28 "
Emaciation and dehydration	23 "
Fecal vomiting	16 "
Nutritional edema	10 "
Loss of body hair	1 "
Salt craving	1 "
Reduced serum protein	15 "

Anemia hypochromic (loss of iron)	52%
Anemia macrocytic (Castle's anti-anemic principle)	14%

Vitamin deficiencies—All patients tested showed subnormal ascorbic acid levels in the blood, while 1 patient showed ecchymosis. Prolonged prothrombin time was found in 43% of 14 patients tested. Vitamin B deficiencies were found most commonly.

Physical examination does not help much. Usually one finds all the signs of starvation, dehydration, nutritional edema, etc. There may be mild tenderness and occasionally a mass palpable to the left of the umbilicus. Peristalsis may be quite marked. Diagnosis is best made by means of the history and by x-ray examination. In Grey and Sharpe's¹⁹ series of 49 cases, diagnosis was made by x-ray of the stomach in 13 instances and by barium enema in 25 cases.

SURGICAL TREATMENT

The most important etiological factor in "peptic ulceration" is undoubtedly a high gastric acidity. In fact, many investigators²⁵ believe that an ulcer will not occur in the presence of achlorhydria. When surgery is indicated for duodenal or jejunal ulcer, the ideal operation is one which effectively reduces the hyperacidity by means of a radical gastric resection. However, when a patient presents himself with a gastro-jejuno-colic fistula, he is usually in such a run-down, debilitated state that surgeons have been justly reluctant to perform any more than the most conservative procedure necessary to repair the fistula, feeling that any additional attempt to correct the ulcer diathesis invites disaster. Consequently the usual operations have been one of the following conservative procedures:

1. Lysis of the gastro-enterostomy, repair of fistula, and restoration of normal intestinal continuity.
2. Lysis of the old gastro-enterostomy, repair of fistula, and formation of a new gastro-enterostomy or pyloroplasty.

3. Repair of the fistula preserving the old gastro-enterostomy.

Recent reports have shown that such restorative procedures have resulted in a high recurrence rate of the original duodenal or jejunal ulcer. Lahey estimates this figure to be 40 per cent,²² Pfeiffer³¹ 20 to 25 per cent. In a review of the available literature we were able to find case histories of 31 patients (reported by twelve authors) who were submitted to some such type of operation. An analysis of the results confirms the estimates of Lahey and Pfeiffer. In these 31 patients, repair of the fistula consisted in separation of the involved organs with closure of the openings; however, in a few cases resection of the colon was necessary. None of the patients had gastric resection or preliminary colostomies.

CASES		RESULTS	
Restoration of normal intestinal continuity	18	Improved	15
Preservation of original gastro-enterostomy	9	Unimproved	9
Formation of a new gastro-enterostomy	4	Died	7
Total	31		31
		Mortality—22.6%	
		Mortality and Morbidity—51%	

Of the 9 patients having further trouble, 3 had evidence of recurring duodenal ulcer, 2 had recurring jejunal ulcers, and surprisingly, 4 had recurring gastro-colic fistula. All but one of the 15 patients reported improved were followed less than six months, and it is reasonable to believe that these morbidity figures would have been much higher had longer follow-up studies been made.

Because of these discouraging results, there is a growing tendency among surgeons to perform an operation which not only repairs the fistula but also corrects the ulcer diathesis by means of a gastric resection. With proper preliminary care, there is reason to believe that the resultant combined mortality and morbidity will be considerably reduced. This has been shown by three successive reports from the Mayo Clinic showing that, although the mortality has remained about the same, the number of gastric resections performed has gradually increased.

Date	Author	No. of Cases	No. of Gastric Resections	Mortality
1925—	Verbrugge, ^{30,14} Mayo, ²⁸		0	25%
	Mayo Rankin ^{29,7}	21		
1939—	Walters ³⁷	50	9	32%
1943—	Atwater, Butt, Priestly ²	42	17	27%
	(1935-42)			

In the group of 42 patients studied by Atwater, Butt, and Priestly, 17 were submitted to gastric resection. Of these 17 patients, only one died and only one was reported to have further trouble, whereas, of the remaining 25 there were 9 deaths and 9 who had further trouble.

Other surgeons have likewise shown that gastric resection can be performed in one stage with a comparable mortality. Allen¹ reports 8 cases with 2 deaths, or a mortality of 25 per cent. Four of the patients recovered after a one-stage operation which included a gastric resection. Three of the patients had restoration of normal continuity. Two of these died, whereas the third had recurring hemorrhage requiring a gastric resection at a later date. Allen favors, however, a block resection of the stomach, colon, and jejunum using a modified Kerr aseptic technic. He performed this type of resection in one case with excellent results.

Kelly²¹ reports 8 cases in which he performed a gastric resection with 2 deaths, a mortality of 25 per cent.

Finsterer¹⁶ also believes in a radical operation including a gastric resection. He reports 19 operations with 7 deaths. He believes this mortality will be reduced by a two-stage resection of the colon. He performed this one-stage operation on 96 cases with simple jejunal ulcer, with a mortality of 6.8 per cent and 91.6 per cent cures.

Lahey²⁴ advocates a radical two-stage operation. After preliminary end to side ileo-colostomy, he does a block resection of the stomach, jejunum, and entire right colon, removing the fistula intact. He and Marshall have performed this operation on 8 cases with 1 death. Previously he had reported a mortality of 63 per cent.

Many other interesting procedures have been suggested, none of which has had extensive use. Findlay¹⁹ reports a case in which he utilizes the Miculicz procedure. He divides the stomach and jejunum near the fistula. After anastomosing the jejunum and repairing the stomach, he exteriorizes the colon including the undisturbed fistula. This exteriorized colon is then removed subsequently, in the manner of Miculicz. The method seems logical and is certainly aseptic. However, it does not correct the ulcer diathesis. A gastric resection could be performed at the same time or at a second stage. The obstructive resection method over a clamp could be used in a similar manner.

Eggers,¹¹ in one case of a very large fistula, divided the transverse colon proximal and distal to the diseased area and performed an anastomosis about it, leaving the mid portion of the colon communicating with the stomach. The result was very satisfactory.

Schriminger³⁴ advocates a radical gastric resection leaving a cuff of stomach adjacent to the fistula. After excising the mucosal lining, this cuff is sutured together and the jejunal ulcer and fistula are left untouched. He used this method on 4 cases with uncomplicated jejunal ulcer and all of them made excellent post-operative recoveries. He tried it on one patient with a gastro-colic fistula, but the patient died from a leak in the polya anastomosis. Estis, in a similar exclusion type of operation, found, on reopening the abdomen later for recurring duodenal ulcer, that the original jejunal ulcer had completely healed.

PRELIMINARY TREATMENT

Regardless of the type of operation used, adequate pre-operative preparation is imperative when dealing with such a debilitating disease. This has been convincingly demonstrated by Grey and Sharpe¹⁹ in a study of 49 patients submitted to a one-stage operation. Thirteen of these patients were considered good surgical risks and were operated upon within two and a half days of admission after only minimal preparation (7 were operated upon the day after admission). The mortality in this group was 61.5 per cent. The remaining 36 patients were treated for at least one week before operation, with a resultant mortality of 27.7 per cent. Seven patients in this group who were considered in worse than average condition on admission and who were given the most thorough preparation were operated upon with only 1 death. Collier⁷ reports a mortality of over 40 per cent

prior to 1930. Since that time, with meticulous pre-operative preparation requiring at least a week of pre-operative hospitalization, he has had 2 deaths and a consecutive series of 16 successful one-stage operations. Only one of these was submitted to a radical gastric resection, the remainder were simply restorations, 5 of which had accompanying pyloroplasties. Already there have been 2 recurrences of the original duodenal ulcer.

These studies emphasize the necessity of at least a week of pre-operative hospitalization during which time every effort is applied towards bringing the disturbed physiology back to as near normal as possible. Fluid and nourishment should be administered in the form of intravenous glucose and intravenous saline. Transfusions of blood and plasma should be given to correct the anemia and the disturbed plasma protein levels. Vitamins should be given in large doses, especially ascorbic acid, the B complex group, and vitamin K where the prothrombin time is increased. Frequent cleansing enemas, and gastric lavages are essential to obtain adequate decompression of the stomach and intestine. The sulfonamides are of value in reducing the infection about the fistula and also in reducing the bacterial count of the intestinal flora.

Probably the most valuable adjunct to our armamentarium in the treatment of this disease is the use of a preliminary colostomy, especially when a marked uncontrollable diarrhea is present. Pfeiffer^{30,31} has shown that the diarrhea associated with gastro-jejuno-colic fistula is due not to the entrance of gastric contents into the colon, but rather to the passage of colonic material into the small bowel, resulting in a marked hyperperistalsis. He has shown that after a preliminary right-sided colostomy, the diarrhea in most cases is checked immediately, with a rather marked improvement in the patient's general condition. In 1940, through a questionnaire to members of the American Surgical Society,³¹ he was able to collect 15 cases treated in this manner with but 1 death, a mortality of 6.6 per cent. Ten of these patients were subsequently treated by gastric resection, whereas, 5 were treated by simple restorative procedures. Similar observations have been made by Mathewson,²⁷ Colp⁸ and others.

CASES

During the past year and a half, we have operated upon 2 cases with gastro-jejuno-colic fistula and 1 case with a penetrating jejunal ulcer with impending fistula. These 3 cases were all operated upon in one stage, and all three operations included a radical gastric resection. Preliminary colostomy was not done because we were able to control the diarrhea pre-operatively. Because this condition is relatively uncommon, we feel that these cases are worth reporting. Each of them shows some interesting points regarding this dreaded complication of gastric surgery.

Case 1. (HMB). Fifty-four year old male who had had a duodenal ulcer for over 15 years. Six years before admission he had a gastro-enterostomy performed for pyloric obstruction. Eight months after this operation he developed recurring pain in the left upper abdomen. He was told he had adhesions, and a second laparotomy was performed with no subsequent relief. He became progressively worse in spite of diet and medications. One year before admission, he developed a diarrhea and six months later began vomiting fecal material. He lost 43 pounds, weighing 135 on admission. A pre-operative diagnosis of gastro-

colic fistula was confirmed by x-ray examination which showed barium passing from the stomach directly into the right colon. Barium by enema could not be forced past the splenic flexure.

Operation was performed after six days of pre-operative preparation, during which time the diarrhea was checked. Exploration revealed a gastro-jejuno-colic fistula involved in a small indurated mass. After isolation of the gastro-enterostomy, the attached colon was separated, revealing a fistulous opening 1½ cm. in diameter. This fistulous opening was closed immediately. The gastro-enterostomy was then disconnected and the jejunum was repaired transversely, leaving an adequate lumen. Four-fifths of the stomach was then resected, including the scarred narrowed duodenum containing the original healed ulcer. An anterior Polya anastomosis was performed between the stomach and jejunum distal to the previously repaired portion.

The post-operative course was uneventful. The gastric tube was removed on the seventh post-operative day and the patient began taking a progressive Sippy diet. He had no intra-abdominal complications. The wound healed by primary intention. He was out of bed on the thirteenth post-operative day and dismissed on the fifteenth post-operative day.

Check-up examination one year later: The patient had gained 30 pounds in weight and was feeling fine. He had ignored his diet and was smoking and occasionally drinking beer. He complained of slight distress when he overate. X-ray of his stomach revealed a well-functioning anastomosis which would empty in half an hour. Gastric analysis with fluoroscopic control of the tube revealed no free HCL even after stimulation with histamine. Patient advised to stay on his diet and to continue antacids.

Case 2. (AF) Forty-five year old man who had had a duodenal ulcer for over 20 years. Six years before admission a gastro-enterostomy was performed. Three years after this operation he developed recurring epigastric distress, which became progressively more severe. He passed bloody stools and vomited blood on two occasions. One month before admission, he developed constant vomiting of the retention type, and a diarrhea. He lost 54 pounds, weighing 118 on admission. In spite of everything he had an excessive appetite. X-ray of the stomach and colon revealed a "narrowed gastro-enterostomy with probable jejunal ulcer." Gastro-colic fistula was not seen.

Operation was performed after 36 days of pre-operative preparation during which time the diarrhea was controlled. Exploration revealed a narrowed gastro-enterostomy with an indurated mass containing a gastro-jejuno-colic fistula, measuring 2 cm. in diameter. The stomach and small bowel were dilated and thickened but well compressed. There were extensive adhesions. Gas and intestinal content could be forced from the colon into the stomach but not vice-versa. The duodenum was constricted by the healed scarred primary duodenal ulcer. A partial resection of the transverse colon was done, with end to end primary anastomosis. Then the portion of the jejunum attached to the stomach was resected, with an end to end anastomosis of the jejunal loops. A gastric resection was then performed removing two-thirds of the stomach. The duodenal stump was dissected and buried against the head of the pancreas. An anterior Polya anastomosis was then made between the stomach and the jejunum distal to the previous end to end anastomosis.

Immediately post-operatively, the patient had a sharp rise of temperature (102) and pulse (130) as a result of pulmonary atelectasis. This gradually cleared up, and temperature was normal on the fifth post-operative day. He developed a mild wound infection and thrombophlebitis of the left leg, which cleared up before dismissal on the forty-fifth post-operative day. He had no intra-abdominal complications.

Check-up examination one month later revealed a weight gain of 30 pounds. He had no pain and felt better than at any time in the past 20 years. X-ray examination revealed rapid stomach emptying at first and then partial retention of the barium for nearly two hours. Gastric analysis with fluoroscopic control of the tube showed no free HCL and a combined acid of 17 degrees. In a recent letter, patient stated that he had gone back to work and was feeling fine.

Both of these patients had gastro-jejuno-colic fistulas following gastro-enterostomy for duodenal ulcer. Both of them recovered after a one-stage operation including

a radical gastric resection with anterior Polya gastro-enteric anastomosis. Both showed a rapid weight gain and, when last seen, two months and one year later, were feeling well and had no complaints. Both of these patients were given extensive pre-operative preparation during which time the diarrhea and vomiting were checked. The slight anemia and reduced plasma proteins were corrected with preliminary transfusions. The fluid balance was restored with intravenous glucose and saline. Daily cleansing enemas and gastric lavages were given. Vitamins were given in large doses parenterally. Because of the improvement under this regimen, a preliminary colostomy was felt unnecessary, since the diarrhea had checked. Gas ether anesthesia was used in both cases. The operations were difficult and required four and six hours, respectively. Five grams of sulfanilamide powder was distributed evenly about the operative site before closure. Case 1 had an uneventful post-operative course and was dismissed on the fifteenth post-operative day. Case 2 had mild atelectasis immediately, and later had a mild wound infection and thrombophlebitis of the left leg, which cleared up completely before dismissal on the forty-fifth post-operative day. Neither had any intra-abdominal complications. Gastric drainage was maintained for seven days, following which a progressive Sippy diet was started. Three thousand cubic centimeters of parenteral fluids were given daily in addition to frequent blood transfusions and large doses of ascorbic acid and Vitamin B Complex. Although preliminary gastric analysis showed a free hydrochloric acid of 56 degrees on Case 1 and 38 degrees on Case 2, post-operative check-up revealed no free HCL, even after stimulation with histamine. The tube was inserted under fluoroscopic control. X-ray and fluoroscopic examination showed only a small portion of stomach remaining with a good functioning anastomosis.

Case 3. (HMB) Thirty-nine year old white female admitted to the hospital August 5, 1942, operated upon August 25, 1942, and dismissed October 8, 1942. She gave the following history:

1927—Bilateral salpingectomy and appendectomy for ectopic.

1934—Automobile accident with injury to right side of abdomen followed by a long period of hospitalization, during which time she vomited bile and became jaundiced.

1934—Cholecystectomy—no stones found but many adhesions were present. Prolonged convalescence complicated by bile peritonitis.

1938—Began vomiting and having aggravating abdominal distress. Thought to have a duodenal obstruction.

1939—Posterior gastro-enterostomy performed. Exploration revealed a dense band of adhesions partially obstructing the first portion of the duodenum and pylorus. Gastric analysis free HCL 45 degrees total 60. No evidence of duodenal ulcer at operation.

Following operation she felt better for a while but continued to have abdominal complaints. She developed rather severe infectious arthritis with swelling and deformity of the joints. About a year before admission she developed increasing pain and discomfort in the left side of the abdomen not related to meals. Pain penetrated through to the back. She began vomiting and on three occasions vomited blood. She noticed tarry stools several times, and at one time passed coffee colored stools. The pain could not be controlled by diet or medications. She gradually lost weight and strength and on admission weighed about 80 pounds. Physical examination revealed evidence of atrophic arthritis of the arms and legs. The abdomen was scaphoid. A small intestinal pattern could be seen on the emaciated abdominal wall. There was a tender mass the size of a

lemon just to the left of the umbilicus. The mass was movable and seemed to be connected with the small bowel. The day before admission she had a rather severe gastro-intestinal hemorrhage, vomiting blood and passing frequent loose wine-colored stools.

Gastric analysis, no free HCL, no combined HCL, 4 plus blood (unreliable because of bleeding). X-ray of the colon negative, x-ray of the stomach showed a rapidly emptying gastro-enterostomy, no ulcer seen, no emptying through the pylorus. The palpable mass was at the site of the gastro-enterostomy. Stool examination revealed a 4 plus occult and old blood.

Operation performed after 20 days of extensive pre-operative preparation. A jejunal ulcer was found anterior and just distal to the gastro-enterostomy, forming a mass the size of a small walnut surrounded by omentum. The mass was adherent to the overlying colon. The ulcer had penetrated through the bowel wall into the mesentery of the colon, and the base of the ulcer was encroaching upon the wall of the colon, but had not penetrated through it. The duodenum revealed a narrowing, due to overlying adhesions. The gastro-enterostomy was separated and excised. The large opening in the jejunum was closed transversely. Four-fifths of the stomach was then resected and an anterior Polya type of end to side anastomosis performed. The duodenal stump was carefully closed over a clamp and buried in the pancreas. The defect in the colonic mesentery was closed.

Post-operative course was uneventful except for an exacerbation of her arthritis, which required considerable care. Her knees, hands, and feet were swollen, tender, and painful. Her abdomen remained soft. The stomach tube was removed on the eighth post-operative day, after she was taking liquids without distress. Her bowels began moving on the fifth post-operative day. The wound healed by primary intention. She gradually increased her diet to a tenth day Sippy regimen. She was dismissed on October 8, 1942, forty-two days after the operation. If it had not been for the unfortunate arthritis, she would have been home much sooner.

Six months examination—patient felt much better. She complained of only minimal epigastric discomfort after overeating. She states: "You don't know how much it means to me not to have that pain and discomfort in my stomach." She was staying on her diet and taking antacids as directed. She still was bothered with arthritis and was being treated by the medical service. Gastric analysis showed no free HCL after histamine. Fluoroscopic revealed a good functioning gastro-enteric anastomosis with an emptying time of half an hour. She gained about 26 pounds in weight.

This patient is presented as an impending fistula. She had a large jejunal ulcer which had penetrated deep into the mesentery of the colon and was encroaching on the colon. She had had repeated hemorrhages, and undoubtedly would have developed a fistula within a relatively short time. The case is unusual in that it occurred in a female who did not originally have a duodenal ulcer. A gastro-enterostomy had been performed for a benign obstruction of the first portion of the duodenum. Gastric analysis revealed no free HCL. However, the test was unreliable because of gastric bleeding. Her post-operative course was very satisfactory except for an aggravating, painful arthritis. Following operation, she gradually improved and six months later had no complaints except for her arthritis. She was likewise given a prolonged pre-operative period of treatment similar to the above cases.

SUMMARY

Gastro-jejuno-colic fistula presents a most serious complication of gastro-enterostomy. Unless properly treated by surgery, these patients slowly die of starvation and inanition. This condition is a formidable surgical problem, and regardless of the type of operative procedure, the mortality is high. Failure to correct the ulcer diathesis results in a high percentage of recurrent duodenal

and jejunal ulcers. The operation of choice seems to be one which corrects the fistula and also includes a radical gastric resection in one or multiple stages. Three patients are presented who recovered from an operation of this type performed in one stage. Two of these patients had gastro-jejuno-colic fistula, whereas the third had an impending fistula. Emphasis is placed on the importance of extensive pre-operative preparation, which includes a preliminary colostomy when uncontrollable diarrhea exists.

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Advances in the Treatment of Hypertension*

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PERMANENT elevation of the blood pressure is a disease of high incidence and great seriousness. Its origin and cure have been one of the greatest problems facing physicians.

The term "essential hypertension" is used to embrace both the so-called benign and malignant forms. In the benign form, the patient usually develops symptoms in the forties or early fifties after having an elevated pressure for five to ten years. Often the elevated pressure is discovered during a routine examination, the patient being entirely free from all symptoms. If he complains at all, the symptoms are those of mild headaches, transitory precordial pain or malaise. In the benign form the disease runs a slow placid course and terminates usually in heart failure, stroke, or uremia years later.

Malignant hypertension differs from the benign form only in degree of severity, speed of progress and ultimate outcome. Clinically, malignant hypertension occurs in young people, often in their thirties or before. The blood pressure which has been elevated for a year or two suddenly becomes fixed at a higher point than usual, and then certain events take place. Headaches are almost invariably present. Loss of appetite, loss of weight, and vomiting often develop. Marked changes take place in the eye-grounds, characterized by choking of the discs, old and fresh white patches scattered throughout the retina, old and fresh hemorrhages, and edema of the entire retina which obscures the constricted arterioles of the retina. The downward trend of the disease is rapid and stormy, death coming abruptly within a period of from a few months to a few years.

It is a medical truism that therapy is most effective when based upon a firmly established etiological footing. Hypertension is a symptom which may depend upon one of many causes. Thus, a broad discussion of treatment must include a brief discussion of the etiology of the disease. Helwig¹ groups the main theories into four major categories.

Group 1. Neurogenic theory. Individuals leading a high tension life are apparently more susceptible to the disease, but it is by no means confined to this class. Predisposition to the disease undoubtedly occurs in those individuals from whom one can obtain a family history of cardiovascular disease with arterial accidents.

Group 2. Endocrine theory. Diseases of the ductless glands have been thought to play an important part in the etiology of this disease. Hyperthyroidism may be a factor. Tumors of the adrenal glands such as medullary paragangliomas and cortical adenomas may be accompanied by hypertension. Ovarian tumors, pituitary adenomas, and toxemias of pregnancy often lead to hypertension.

Group 3. Toxic theory. Under this group come lead and mercury poisoning and the effects of tobacco.

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Group 4. Renal theory. Quite recently the old theory that hypertension was due to disease of the kidney has been given significance as a result of the experimental investigations of Goldblatt, Page and others. Some very interesting experiments were performed. Clamping of the main renal arteries of both kidneys resulted in a marked rise in blood pressure. Removal of this ischemic kidney caused the pressure to return to normal. Severe constriction of the renal artery of the remaining kidney resulted in a re-elevation of mean blood pressure. Bilateral nephrectomy did not result in the development of hypertension, but bilateral occlusion of the ureters resulted in a marked rise in blood pressure.

Two well-known congenital renal anomalies, congenital polycystic disease and hypoplasia of the renal artery sometimes produce high blood pressure. Either bilateral or unilateral pyelonephrosis, periarteritis nodosa with renal involvement, or lupus erythematosus when kidney damage is present may all be accompanied by hypertension. Moreover, increased blood pressure may be present when there is some compression of the renal parenchyma as is sometimes observed in children with Wilms tumor or even with traumatic hematoma of the kidney. Page², by using a cellophane or silk capsule experimentally on the kidneys of dogs, has produced perinephritic scarring, thus causing slight constriction of the whole kidney with resultant hypertension.

Page³ and others are of the opinion that certain chemical substances elaborated by the kidney are the real cause of hypertension. They have found a substance in normal kidneys which has been called renin. This substance is also found in the peripheral blood. It has been shown that renin alone is incapable of producing increased arterial tension, whereas when it is combined with renin-activator, a powerful vasopressor substance is produced. This latter substance has now been crystallized and has been called angiotonin.

Page has also demonstrated that the normal kidneys contain a substance which neutralizes the action of angiotonin. An increase in the amount of renin-activator in the blood or a decrease of renin-inhibitor is therefore thought to be the cause of hypertension. Certain extracts have been prepared which appear to be efficient when used under carefully controlled conditions.

The clinical picture and course of each case of hypertension is, therefore, a composite of the degree and kind of renal, toxic, endocrine and neurogenic participation. The modern treatment of hypertension consists of medical treatment, surgical treatment and the use of kidney extract.

MEDICAL TREATMENT

A prescription for a proper mode of living has always been an important therapeutic aid. Excessive physical strain, anxiety and intemperance of various kinds are all to be avoided. There is a tendency of many practitioners

to overemphasize the significance of benign hypertension. Too many of these patients are rendered over-anxious by constant attention. They are placed on diets much too strict and visit the physician much more frequently than need be. A lot of assurance and a little sedation does far more good for the vast majority of these people. The sedatives most commonly used are the bromides and barbiturates. One gram of the triple salts of bromide may be given from two to four times a day and can be continued for long periods if the patient is under observation. Phenobarbital in small doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain three or four times a day is also widely used but the drug tends to lose its efficacy after prolonged use. Another indication for the use of sedatives is to insure an adequate period of sleep at night.

The duration of action of the nitrites is altogether too brief to be of any value in controlling hypertension, but the judicious use of these drugs may give the patient marked symptomatic relief. The use of the nitrites should be reserved for acute crises such as angina pectoris.

The thiocyanates have been used in the treatment of hypertension since 1900. However, due to its toxic manifestations, the drug has not been in general use until recently when it was reintroduced by Barker,⁴ who emphasized the importance of the control of the blood cyanate level. Toxic symptoms usually do not develop unless the blood level of thiocyanate rises to 15 mg. per cent. A number of patients cannot tolerate this drug because of various side effects. Many in whom the pressure falls sharply complain so much of lassitude and weakness that it must be discontinued. A few have erythematous skin eruptions necessitating discontinuance. We have had one case of thyroiditis evidently produced by this drug and two cases of thrombosis of leg veins evidently due to stasis following the marked drop in blood pressure. There have been fatal cases reported from time to time and that is the reason the drug has never been accepted by the Council on Pharmacy and Chemistry. Hence, we see the necessity for close observation of our patients when this drug is used. The symptoms of toxicity are profound weakness, almost a shock state in some, and toxic psychosis with hallucinations and delirium.

The aim of treatment is to obtain an adequate hypotensive effect with the least possible thiocyanate and carefully to avoid more than 14 mg. per 100 cc. of thiocyanate in the blood. The doses used have been $1\frac{1}{2}$ grs. three or four times a day which usually result in the optimal level. If the enteric coated tablets are used, gastric upsets hardly ever result. Patients with advanced heart failure, malignant hypertension, renal insufficiency and marked arteriosclerosis are excluded from this form of treatment. Approximately one-third of our patients so treated have had a decided drop in blood pressure and were benefited clinically. In about 40 per cent of the patients, the treatment seems to have neither advantage nor great disadvantage but was unsuccessful. Of the remaining cases, 15 per cent obtained symptomatic relief without a marked drop in blood pressure, and the other 15 per cent were made worse and treatment was discontinued.

Such preparations as garlic, parsley, mistletoe and watermelon seed have never been shown to be effective in lowering blood pressure.

Diets of all kinds have been tried. The most important dietary consideration is the control of obesity. Even if no reduction in blood pressure occurs, the correction of obesity will protect the heart against the increase in work the overweight entails. Moderate restriction of salt intake will often relieve patients of their headaches and dizziness. Protein intake should not be reduced below the daily requirements of 50 to 70 gm.

The treatment of cardiac symptoms especially demands consideration. Hypertension is the cause of more than half of the cases of cardiac decompensation which we are called upon to treat. Many times these cases are first encountered when this event has supervened. The blood pressure may be within normal limits when seen and the urine loaded with albumin, the liver enlarged and the extremities edematous. This condition is often misinterpreted as nephritis. The treatment then is salyrgan, reduced fluids, and digitalis, as in any case of circulatory decompensation.

SURGICAL TREATMENT

In the light of the recent research work of Goldblatt,⁵ the so-called surgical kidney has assumed more importance than ever before. All patients with hypertension should be submitted to complete urological investigation as part of their routine examination, even in the absence of signs or symptoms of urinary tract disease.

One of the direct therapeutic results of the Goldblatt experiments has been the very beneficial procedure of nephrectomy in atrophic pyelonephritis for hypertension. Braasch and Walters made one of the early reports in the *Journal of the American Medical Association* of November 30, 1940. They reviewed the incidence of hypertension in various types of surgical disease of the kidney and found it much higher in these atrophic types of pyelonephritis than in other diseases. The figures are interesting. In 1,684 cases of surgical disease of the kidney there were 43 cases of atrophic pyelonephritis. These showed hypertension with blood pressure above 160 in 34.9 per cent, above 145 in 46.5 per cent. In a random group of 976 cases, hypertension above 160 appeared in 13.7 per cent. Other groups of surgical kidney disease including tuberculosis, hydronephrosis and stone were not significantly higher in hypertension than the control group. Braasch and Walters concluded that hypertension will be relieved by nephrectomy in approximately 70 per cent of cases of atrophic pyelonephritis, in 50 per cent of cases of renal tuberculosis and in 25 per cent of cases of renal stone and hydronephrosis. They warn that reduction of blood pressure may be temporary in some cases simply by removal of the toxic or irritant lesion, and that prolonged observation is necessary to prove its permanency.

Operative measures have been employed for reducing essential hypertension by section of the anterior spinal roots from the sixth thoracic to the second lumbar, or by section of the major and minor splanchnic nerves. Authorities^{6,7} agree that a limited number of patients may benefit from the operation. They are those under 50 years of age with a very high blood pressure who have

general vasoconstriction and yet signs of malignant hypertension have not fully developed. The practice of some neurosurgeons to advise splanchnicotomy in individuals with benign hypertension as a step to forestall the ultimate breakdown is questionable, because the course that benign hypertension may take is unpredictable and the benefits of surgery have not been any more satisfactory than those from medical measures. After all, neurosurgery is merely palliative, not curative, since it does not alter the fundamental cause.

In appraising any new case of hypertension we should always be on the alert for hyperthyroidism, not that hyperthyroidism is ever the cause of hypertension, but because here we have two diseases which notoriously damage the heart. One of these, hyperthyroidism, can always be cured, hence we must never be guilty of allowing it to exist with hypertension.

Venesection should also be mentioned as a means of symptomatic relief of vascular symptoms. It is surprising how often patients return time and again for the removal of a pint of blood because of the excellent and protracted relief it affords them.

Renal extracts. Such striking results have been reported by some research workers⁸ on the use of kidney extracts in the treatment of hypertension that the problem has evoked wide interest. The extracts at present are available only for experimental use. Murphy⁹ reports his results as follows:

1. Only patients with severe benign hypertension and early malignant hypertension have been used.
2. In some instances, painful local reactions develop which make the use of the material unacceptable.
3. Twelve patients have been treated; 8 have been considered as showing satisfactory results, 2 failed to respond and 2 were discouraged and quit voluntarily because of unpleasant reaction.
4. No permanent injury has been sustained by any patient.
5. Sometimes patients have been decidedly improved symptomatically, but the drop of blood pressure was not correspondingly great.
6. Obviously it is premature to make any sweeping conclusions about the value of these extracts, but

the results in some cases have been so dramatic that it is difficult to suppress undue enthusiasm.

SUMMARY

1. Hypertension is a very common disease; as a cause of death it is four times as great as cancer.
2. Two types of essential hypertension, the benign and the malignant, run distinctly different courses.
3. It has been quite definitely shown, by the work since Goldblatt's renal clamp experiments, to be of renal origin.
4. The management consists largely of common sense treatment designed to relax the nervous system, to save the heart from extra stress and strain, and to protect the kidneys as much as possible from further damage.
5. There are a certain number of cases due to unilateral kidney disease in which we may expect good results by surgical treatment. We must be especially alert for these cases amenable to surgical treatment in children and young adults.
6. Lastly, there has been more real progress in the understanding of this syndrome in the last eight years than in all previous time, and there is very great hope that the work of Page and Williams with antipressor renal extracts will ultimately give us a real remedy for this condition.

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CORRECTION

Because of a mechanical error, one paragraph of Dr. J. C. McKinley's editorial, "The Psychiatric Problem in War and Peace," which appeared on page 383 of the December issue of the *JOURNAL-LANCET*, was incorrect. The paragraph should have read as follows:

"Every medical man should orient himself as best he can to make his contribution to this situation, since the problems are in principle the same in civilian life as they are in fighting units. Variation is mainly one of frequency and degree of environmental impact on the individual."

A Comparative Study of Ultraviolet Irradiated Ergosterol (Steenbock Process) and Electrically Activated Ergosterol (Whittier Process)

A Preliminary Report

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NUMEROUS conflicting reports on the toxicity and efficacy of massive doses of vitamin D in the treatment of arthritis have appeared in the literature since Dreyer and Reed¹ reported their results in 1935.

Reynolds, who made a careful evaluation of the results obtained by many investigators, offered a possible explanation. He found that the contradictory results were due to the fact that some investigators used ultraviolet irradiated ergosterol (Steenbock Process) while others used electrically activated ergosterol (Whittier Process). The safety and efficacy of these two distinct products differ very markedly. After a careful study of all the available data, he reported: (2) "It is strikingly evident that massive doses of irradiated ergosterol bring about the development of toxic effects without clinical improvement of arthritic patients, while use of the electric-discharge activated heat-vaporized ergosterol (Whittier Process) has consistently been followed by clinical improvement with frequent rehabilitation, and with negligible or no toxic manifestations even over prolonged periods of intensive treatment."

Because of the difference in the biologic and pharmacologic activity of different types of vitamin D, the history of the development of various synthetic vitamin D's is important to anyone who is interested in the use of this form of therapy for the treatment of the chronic arthritides. It is surprising, therefore, to find that even at the present time, many clinicians are not aware of the fact that there is more than one type of vitamin D and that these different forms of vitamin D have different biologic and pharmacologic activity.

As early as 1925, Bills² produced by chemical treatment of cholesterol a new antirachitic substance. This was the first definite evidence that more than one form of vitamin D existed and that a form of vitamin D could be produced by the activation of a compound other than ergosterol. Prior to this time, it was generally believed that there was only one single provitamin, ergosterol, and that there existed only one synthetic vitamin D, namely, that produced by irradiating ergosterol. The activation of cholesterol by chemical means and by irradiation was soon followed by a vast amount of research which definitely demonstrated not only that different forms of vitamin D can be produced but that these differ in biologic activity. Bills⁴ showed that not only is there a difference in the biologic activity of the vitamin D's

produced from different sources but also that the activity of these varied in different species of animals. Thus, in the rat the cholesterol type of vitamin D had the same antirachitic value as the ergosterol type but was one hundred times more effective in the chicken.

At the present time, eleven different forms of vitamin D have been established.⁵⁻⁷ These have been shown to differ in toxicity as well as in biologic and pharmacologic activity.

Reed^{8,9} also has shown that there is a definite difference in the relative toxicity of various forms of vitamin D. Other investigators have demonstrated a difference in the biologic activity. Notable among these is the difference in the antirachitic effect of D₂ and D₃ when used in chickens.

In order to help clarify the confusion which existed and, if possible, to demonstrate some of the reasons for the conflicting reports, we decided to compare the results obtained with both types of vitamin D in our own clinic. We have been studying one form of vitamin D (Ertron) during the past six years. Our results¹⁰⁻¹³ demonstrated that this preparation, when used in doses of 200,000 to 300,000 units daily was safe and effective. As no careful clinical comparative studies have been reported to date, we have started during the past year to study the use of the ultraviolet irradiated ergosterol (Steenbock Process).[‡] The accurate evaluation of the results obtained with electrically activated ergosterol (Whittier Process)[§] during the past six years and with ultraviolet irradiated vitamin D (Steenbock Process) during the past twelve months forms the basis for this report.

PROCEDURE

Thirty resistant cases of chronic arthritis were included in this series. The procedure was similar to that reported by us in previous publications,¹⁰⁻¹³ except that in this present series ultraviolet irradiated vitamin D (Steenbock Process) was used instead of the other type of vitamin D previously tested. Numerous investigators¹⁴⁻¹⁹ have previously reported that ultraviolet irradiated vitamin D cannot be given safely in the same dosage in which electrically activated ergosterol (Whittier Process) was found effective.

RESULTS

In our series with the ultraviolet irradiated form of vitamin D, certain toxic symptoms developed in suscep-

[‡]This product was obtained from Gelatin Products Company, Detroit, Michigan.

[§]Ertron. This product was obtained from Nutrition Research Laboratories, Chicago, Illinois.

*Arthritis Clinic, Hospital for Special Surgery, New York City.

tible patients. Those most commonly encountered were severe gastrointestinal upsets, nausea, vomiting, nocturia, anorexia, headache and general malaise. The toxic manifestations in these cases often persisted for several weeks after all medication was withdrawn, although in some patients the symptoms disappeared sooner. In our present series, twenty-four of the thirty patients (80 per cent) developed toxic symptoms. When these toxic manifestations developed following the administration of ultraviolet irradiated ergosterol, the medication was stopped for a few days and then, in many cases, electrically activated ergosterol (Ertron) was given without any untoward effects and often with definite improvement.

Another distinct handicap to the use of ultraviolet irradiated ergosterol was its frequent ineffectiveness. Twenty-three cases (77 per cent), which received ultraviolet irradiated vitamin D for six months or longer, either showed no improvement or continued to become progressively worse. Seventeen (57 per cent) of these were made so uncomfortable by this form of treatment that they refused to continue the medication. Nine of the failures were persuaded to change to the electrically activated ergosterol, which they were able to tolerate without any untoward effects. Seven of these showed definite improvement when they received the Ertron. The remaining two cases are continuing this form of therapy and are still under observation.

At the present time, our findings with the use of ultraviolet irradiated ergosterol in the treatment of chronic arthritis are in agreement with those reported by Abrams and Bauer¹⁶ in regard to the toxicity and therapeutic value of vitamin D produced by the ultraviolet irradiation of ergosterol. Their conclusions were: "(1) The effect of massive doses of vitamin D has been observed on 18 patients with rheumatoid arthritis. (2) Observations prior to treatment showed that all the patients were in a stationary or slowly progressive state. (3) Subjective improvement lasting throughout the period of therapy was observed in 8 cases. In only 3 instances was this accompanied by objective improvement and in only one was it marked. Such improvement was short-lived when therapy was discontinued. (4) Only 5 patients showed a significant alteration in the curves of their sedimentation rate and only 2 of these were improved subjectively and objectively. (5) Five patients gained weight during treatment. (6) Our results indicate that the administration of massive doses of vitamin D in rheumatoid arthritis is of little or no value in altering the course of the disease. The general effects of the larger doses do not appear significantly different from those observed with the usual therapeutic doses and do not justify the expense and dangers involved."

The results obtained by these investigators with ultraviolet irradiated vitamin D are similar to those which we obtained with this same type of vitamin D.

We wish to emphasize, however, that they studied only this one form of vitamin D (ultraviolet irradiated ergosterol) and, hence, the above conclusions in regard to the toxicity and lack of therapeutic effectiveness apply only to ultraviolet irradiated ergosterol and cannot serve as a basis for judging the safety and efficacy of other forms

of vitamin D. Our research during the past six years, as well as the results obtained by many other investigators,^{2, 10-13, 20-33} definitely demonstrate the therapeutic effectiveness and safety of at least one type of vitamin D (Ertron).

SUMMARY

1. Definite differences have been demonstrated in the relative toxicity and therapeutic effectiveness of different types of vitamin D.

2. The therapeutic value and toxicity of ultraviolet irradiated vitamin D, in doses ranging from 150,000 to 300,000 units per day, in the treatment of chronic arthritis were studied in a group of thirty patients during a period of twelve months.

3. Eighty per cent of the patients were unable to tolerate the required dosage. The toxic manifestations were so severe as to necessitate cessation of the medication.

4. Seventy-seven per cent of the cases were not benefited even after six months of treatment and fifty-seven per cent refused to continue the medication. Definite objective improvement was observed in only five of the patients (17 per cent).

5. Our results obtained with ultraviolet irradiated vitamin D agree with those reported by Abrams and Bauer and other investigators who studied this form of antirachitic agent. They are in sharp contrast, however, to the results obtained with electrically activated ergosterol (Ertron).

6. With electrically activated ergosterol (Whittier Process), carefully controlled investigations during the past six years have definitely demonstrated the safety and therapeutic effectiveness of this form of medication.

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Student Health Rates, University of Michigan*

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MANY statistical items from twenty-five years of continuous health service experience with young adults are available at the University of Michigan. The quite complete clinical service has been such, that the experience should reveal clinical health needs of young adults under almost ideal conditions. Selected tables of rates from these data will soon be ready here to increase available records of special studies upon which much of our knowledge of morbidity depends.

These tables summarize records of entrance health examinations of college freshmen and illness experience of practically all students in the university. Some items of costs and administration are included. Items vary from three to thirty, as to years of tabulated data. The entrance examinations concern about one thousand boys and five hundred girls each year, and the other items are based upon regular university session populations of about eight thousand annually. Most of the items in the tables have been reduced to a single rounded representative figure, with some indication of trends, in the tables given herewith.

PART I

ENTRANCE HEALTH EXAMINATIONS—FRESHMEN

A—History (student statements by sex)

Item	Percentage		Trend
	Men	Women	
History—Family			
Ave. age, parents and grandparents—61 years			
Ave. number brothers and sisters—2			
Mother's build slender (student opinion)	16	18	
Father's build slender (student opinion)	18	25	
Mother's build stout (student opinion)	20	20	
Father's build stout (student opinion)	25	18	
Hay fever in family	18	22	
Hives in family	9	9	
Asthma in family	13	17	
Sick headaches in family	17	17	
Apoplexy in family	8	8	
Diabetes in family	13	15	+
Ulcer stomach in family	11	14	
Cancer in family	19	23	
Tuberculosis in family	12	15	
History—Personal			
Ave. age Student:			
Men 18.5; Women 18.1 years			
Had physical examination within a year	80	75	
Had chest x-ray previous to entrance	30		
Headaches	20	20	
Appendicitis	10	10	
Constipation	10	12	

*From the Student Health Service.

Hay fever	9	9	
Hives	4	7	
Asthma	3	3	
Frequent head colds	22	18	
Frequent sore throats	10	10	
Measles	90	90	
Scarlet fever	20	20	
Diphtheria	3	3	
Pneumonia	10	10	
Diabetes	0.3	0.3	+
Herniorrhaphy	2		
Appendectomy	9	10	+
Glasses never worn	60	50	+
Tested for glasses "drops used"	55	50	+
Dental exam, past year	90	93	
Have known devital teeth	12	9	—
Have known devital teeth and x-ray exam.	65	70	+
Health good or excellent (student opinion)	95	95	
Listed points for health consideration	13	11	—
Allergy (history rating) definite	12	14	
" " " probable	27	25	
" " " doubtful	14	10	
" " " potential	22	25	
" " " none	25	25	
Menstrual:			
Began age 11 or under		15	
Pain moderate		25	
Pain severe		12	
Duration 5 to 6 days		65	
Regular		80	
Having parent's signature to history blank	85	85	+

B—History (objective findings)

Item	Percentage		Trend
	Men	Women	
General appearance Good and Excellent	90	90	
Goiter present	2	15	—
Vaccination scar	90	95	
Tremor hands present	15	7	
Organic heart defect noted	3	4	
Tuberculosis, pulmonary active	0.1	0.4	—
Defective hearing	4	4	
Teeth good in general	70	85	
Occlusion normal	80	95	
Gingival defects noted	15	10	
Tonsils out well	60	70	+
Deviated nasal septum	30	12	
Color blindness (Ishihara)	7	0.2	
Visual acuity 20/20 or better O.U.	60	60	
Visual acuity 20/50 or worse O.U.	15	20	
Acne none	60	70	
Acne moderate	10	5	
Tinea feet (active or inactive)	65	15	
Height men 69.2; women 64.1			+
Weight men 148; women 124			+
Phimosis	2		
Hernia	1		
Undescended testicle		0.5	
Hydrocele		0.7	
Pilonidal sinus		2.0	
Albuminuria	5	5	
Mental hyg. rating unsatisfactory (impression)	20	20	
Activity unlimited	80	85	+
General Health Rating A	60	70	+
Listed for follow-up	55	75	

(*) + = "increasing"; — = "decreasing".

**PART II
ILLNESS AND ADMINISTRATION EXPERIENCE**

A—General Items
(Rates per 1,000 population—annual 9 mos.)

	Men and Women		Trend
	Men	Women	
Patients for some service	950		
Clinic calls	11,000		
Clinic calls daily average	55		+
Room calls	135		
Deaths—all causes and places	0.3		—
Infirmiry and Hospital admissions	250		
Laboratory determinations	3,200		
Refractions	175	190 160	
Mental hygiene consultations	500		
Patients in allergy service	175		
Physiotherapy patients	150		
Prescriptions at pharmacy	1,500		
Emergency operations	10		
Tonsillectomy	10		
Submucous resections	5		

B—Diagnoses
(Rates per 1,000 population—annual 9 mos.)

Acute upper respiratory infections	700	500	
Comp. myopic astig. (per 1,000 refractions) men 293; women 294			+
Comp. Hyperopic Astig. (per 1,000 refractions) men 289; women 297			—
Dermatophytosis		170 70	
Pneumonias	8		+
Tuberculosis, Pulmonary Active	2		—
Vincent's Angina	5		
Acute appendicitis	12		+
Acute Otitis Media	5		
Acute sinusitis	10		
Bone fractures	12		
Reactions psychiatrically classifiable	110		
Scabies	2		—
Gonorrhoea	2		
Syphilis	1		
Diabetes	1.5		+
Pneumothorax spontaneous (persons)	0	0.6 0	+
Infectious mononucleosis	10		+
Psychosis (new cases)		1.3 3.1	

C—Selected Items by Class and Sex
(Rates per 1,000 population—annual 9 mos.)

	Men	Women
Patients for some service:		
Freshmen	900	920
Sophomores	900	850
Juniors	900	950

Seniors	900	950
Patients Infirmiry and Hospital admissions:		
Freshmen	180	180
Sophomores	180	180
Juniors	180	180
Seniors	180	180
Clinic calls:		
Freshmen	9,000	9,250
Sophomores	8,000	8,000
Juniors	8,500	8,500
Seniors	9,000	9,500
Infirmiry and Hospital Days:		
Freshmen:	1,000	1,250
Sophomores	1,000	1,250
Juniors	1,000	1,250
Seniors	1,000	1,000
Refractions:		
Freshmen	180	220
Sophomores	200	200
Juniors	150	150
Seniors	200	200
Service in Allergy:		
Freshmen	150	150
Sophomores	120	120
Diagnoses (upper respiratory infections):		
Freshmen	750	550
Sophomores	800	550
Juniors	800	550
Seniors	800	500

D—Costs and Administration

Selected Health Service budget items have most meaning only with an understanding of services included and other circumstances. Service is very generous, including practically unlimited out-patient attention of general physicians and specialists. Emergency surgical operations and thirty days of general hospital care have been included since about 1917. Budget items do not provide for building overhead and service, nor for professional service in emergency operations and some hospitalized cases. All of these would add an estimated cost of about 20 per cent to budgeted items given. Minimum charges are made for some elective and extra services which account for net rates given.

Item	Dollars per 1,000 Population, Regular Session (Recent)
All service within privilege limits (net)	\$15,000
Hospital (bed) service (net)	2,500
Salaries and wages (net)	10,000
Current expenses, drugs and equipment (net)	1,250
Income from extra service charges	2,750
Drugs (net)	200
Per out-patient clinic visit average	90 cents

OTOLARYNGOLOGY STUDY

A continuation course in otolaryngology for physicians who limit their practice to otolaryngology and ophthalmology will be given in Minneapolis from February 7 through February 11, 1944. Registration is limited to fifty physicians.

The faculty for the course will include Oscar V. Battson, instructor in laryngology, University of Pennsylvania, School of Medicine, and professor of anatomy, Graduate School, University of Pennsylvania; Paul H. Holinger, associate in bronchoscopy, department of otolaryngology, University of Illinois, College of Medicine; John R. Lindsay, associate professor of otolaryngology, Head, division of otolaryngology, University of Chicago Clinics; Theodore E. Walsh, professor of otolaryngology, Washington University, School of Medicine; Lawrence E. Boies, professor of otolaryngology, University of Minnesota, Medical School; and associates in the medical and graduate schools.

The tuition is \$25.00, payable \$3.00 in advance and the balance on the first morning of the course. Physicians who are on duty with the military forces will be admitted without fee.

Since the course will be given in a Minneapolis hotel, early registration is necessary in order that reservations may be made in advance.

News-Letter

of the American Student Health Association

The beginning of a new year prompts us to take stock of the accomplishments and failures in our student health work. In the twenty-three years since the organization of our Association, the membership has grown to include 192 colleges and universities accounting for normal enrollments of over 450,000 students. With the exception of 1943, Annual Meetings have provided centers of discussion and exchange of ideas covering problems in our work. The Annual Proceedings have been published and distributed to college presidents and to representatives of member schools. There is an increasing request mailing list, somewhat curtailed by the present war conditions, including several schools outside the United States, and many public and medical society libraries.

In several fields, work of our special committees has pioneered or aroused new interest. The annual reports of the Committee on Tuberculosis are widely quoted, and the surveys made each year stimulated the development of tuberculosis case-finding programs in many schools. Studies of health service organizations and practices made by Storey, Smiley, Forsythe, Diehl and Shepard and others are references for educational and social agencies as well as for health services striving to improve their own organizations. A study of health service records, while it did not accomplish the apparently impossible task of standardizing records, turned attention to the importance of adequate record systems particularly for statistical purposes, and resulted in the renovation of many college health service record systems.

Due to the efforts of other special committees, mental hygiene has been recognized as an integral part of a balanced health service. In the past five years, aided by National organizations, two committees have studied the vision and hearing defect problems in college students. Standards for adequate eye examination and a uniform testing chart have been developed. Use of the audiometer has been accepted as the best method of quantitative testing of hearing in routine examinations. Another committee worked with the Metropolitan Life Insurance Company in compiling a bibliography of health education publications.

When the war changed the complexion of college campuses, our Association early offered its services, and the member services devoted extensive efforts to the work of examination of candidates for various military groups and to the appraisal and correction of physical defects which would disqualify young men from military duty. Today, a large number of our member health services are engaged in providing, with drastically curtailed staffs in most cases, health service not only for the remaining civilian student population, but for large numbers of special training groups of the various branches of the armed forces.

Looking forward, we foresee not only continuation of our previously conceived well-rounded health service incorporating the teaching of hygiene, routine periodic

physical examinations, physical development and campus sanitation, but more attention to medical care and correction of remediable physical defects of college students, particularly on campuses where the student population is predominantly from outside the college town. Even now, there are on many campuses men who have seen service in many quarters of the world and who are to be rehabilitated both physically and mentally. Some of them may introduce new health problems which must be anticipated and met if college health services are to maintain the standards laid down by their leaders in the past.

THE SECRETARY'S MAIL

From many schools come reports of respiratory diseases occurring in near epidemic proportions. Differences of opinion exist as to the proper classification of these respiratory diseases, but it is evident that in many areas influenza is not predominant, comprising around one-third of the cases of respiratory illness. In other schools, influenza of a rather mild type predominates. In every school the condition of limited staffs and increased work is the common story.

Dr. J. D. Farris sends a folder describing a new organization of the health service at Emory University, where he has recently taken the position of University Physician and Director of Student Health. The plan is commendable in that it provides adequate service in a school of 1,600 enrollment with a small staff.

Requests come in frequently for copies of the Annual Proceedings. To every member school, two copies are sent annually, except for 1943 when no Proceedings were published because of postponement of the Annual Meeting. One copy is sent to the college president with a request that he send the copy to the college library after he has read it. The other copy goes to the person listed on our records as the official representative of the school in our Association. In the event that these copies are lost, we have a supply of additional copies for all years except the first three years.

The American Social Hygiene Association reminds us that February 2 is National Social Hygiene Day, and the theme is "United community action against venereal disease, the country's number one health problem." Dr. Walter Clarke stresses the fact that syphilis and gonorrhea are still the most important health problems of the Army, Navy, war workers and youth in general. Interested persons and groups may obtain leaflets giving details of this event by writing to the Association at 1790 Broadway, New York 19, New York.

DIGEST OF MEDICAL NEWS

Shigella Sonnei Survives Chlorination. Green and MacLeod, in the *British Medical Journal* of August 28, 1943, describe an explosive epidemic of Sonne dysentery which was apparently water-borne. The epidemic involved approximately 400 cases. Baffled by the fact that *Bacterium sonnei* was isolated from a sample of water that contained

0.15 part per million residual chlorine and satisfied the usual standards for purity, experiments were done which showed that *B. sonnei* could survive in water containing 0.15 part per million residual chlorine for much longer periods than those applied to much of the water in question. This would appear to reopen the question of the minimal chlorine content to be recommended for municipal water supplies.

Multiple Causes of Essential Hypertension. Recent studies made in the United States, England, and Argentina have emphasized the part that renal ischemia apparently plays in bringing about "essential hypertension." Now Gregory, Lindley, and Levine (*Texas Report Biol. and Med.* 1:167—No. 2, 1943) demonstrate that spinal anesthesia produces a definite fall in the blood pressure of persons with essential hypertension. It would thus appear that there are at least two mechanisms by which essential hypertension may be produced—i. e., a humoral mechanism involving the kidneys and a nervous mechanism involving vasomotor control.

1942 Death Rate the Lowest on Record. A report recently released by the Bureau of the Census, Department of Commerce, reveals that the death rate in the United States for 1942 was 10.4 per thousand of population. This is the lowest death rate ever recorded for our country (the 1941 rate being 10.5 per thousand). Diseases which registered an increase in spite of the decrease in the general death rate were heart disease, cancer, and intracranial lesions of vascular origin. The ten leading causes of death and their rates per 100,000 follows:

	1942	1941
1. Diseases of the heart	295.2	290.2
2. Cancer and other malignant tumors	122.1	120.2
3. Intracranial lesions of vascular origin	90.2	89.1
4. Nephritis	72.4	75.1
5. Pneumonia and influenza	55.7	63.9
6. Tuberculosis	43.1	44.5
7. Premature birth	25.8	25.1
8. Diabetes mellitus	25.4	25.5
9. Motor vehicle accidents	21.2	30.0
10. Syphilis	12.2	13.3

Meningococcic Meningitis and Septicemia. In an article appearing in the October 2 (1943) issue of the *Journal of the American Medical Association*, Col. H. M. Thomas brings out the following points with regard to meningococcic meningitis:

1. The carrier rate among troops arriving in camp in non-epidemic periods is likely to be between 1 and 2 per cent.

2. If these new troops arrive in camp when upper respiratory diseases are prevalent, an extremely high rate of such diseases soon develops among the new troops and includes the carriers.

3. The coughing and sneezing accompanying the respiratory infection not only distribute the respiratory disease virus but also the meningococci introduced by the carriers.

4. The meningococcus carrier rate thus builds up rapidly, rising to 30 per cent or higher.

5. If the organism carried is a Type 1 meningococcus, clinical forms of infection will be apt to occur, particularly during periods of fatigue and exposure.

6. Avoiding fatigue, exposure, too rapid inoculation procedures and overcrowding would probably aid in controlling the infection, but these conditions cannot usually be avoided in military life.

7. It is likely that in succeeding years the case rate can be greatly reduced by the use of prompt prophylactic treatment at suitable points, particularly among unseasoned troops.

8. In a series of 1,518 cases of meningococcic meningitis and septicemia, the early mortality rate of 8.8 per cent in 317 cases was lowered during February and March to 2.1 per cent in 761 cases.

9. Two-thirds of the 1,518 cases developed among unseasoned troops.

10. Of the 55 fatal cases 44 developed among new unseasoned troops.

11. Of 46 cases coming to autopsy 18 showed hemorrhage into the adrenal glands.

Egg Culture Method in Etiologic Diagnosis of Meningitis. Blattner, Heys, and Hartmann, in the September (1943) issue of the *Archives of Pathology*, report favorable results with the use of the chick embryo as a medium in the diagnosis of acute meningitis. In 52 cases of acute meningitis these workers failed to get a positive culture on egg medium only in 1 case, while failure with agar mediums occurred in 4 cases. The egg medium method is of particular value in the prompt identification of the bacterial cause of those cases in which the smear of the spinal fluid reveals no bacteria or reveals doubtful forms.

Importance of Malarial Precautions for Plane Crews. Report has been received by the U. S. Navy's Bureau of Medicine and Surgery of the occurrence of malaria in four members of a plane crew. The records show that all four of these men slept in the same plane and admittedly failed to take antimalarial precautions on an overnight stop in a malarious region enroute. The crew of an accompanying plane and the passengers of both planes under identical circumstances took all antimalarial precautions and none developed malaria. This demonstrates the importance of antimalarial precautions for transient plane crews travelling through malarious regions.

U-V Disinfecting Lamps for Operating Rooms. The *Journal of the American Medical Association* of November 20, 1943, carries a report of the Council on Physical Therapy withdrawing acceptance of the Westinghouse Constant Intensity Sterilamp Units and extending acceptance to the Westinghouse C-I Bactericidal Units. The C-I in this trade name stands for "constant intensity" which is purportedly maintained in this model by means of a manually controlled rheostat which is to be adjusted each month to bring the intensity of the ultraviolet radiation to its initial setting of 20 microwatts per square centimeter at 1 meter distance.



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OXYDOSIS VERSUS ACIDOSIS

In the modern expression of acidity and alkalinity in water or watery solutions the symbol pH is used. In entirely pure water pH is equal to 7 denoting neutral. Any value smaller than 7 is acid and any above is alkaline. This term was first used about 1909 as the result of the pioneer work done by S. P. L. Sorensen, director of the famous Valby Laboratories in Copenhagen, Denmark.

The main point brought out by this research was that the amount of acid or base present in a solution has no direct correlation with the pH. It is the pH, however, that determines the biological effect. The optimum action of enzymes, the growth of bacteria in the human body and the resultant biological consequences are determined by the pH. For example, in gastric juice the pH is nor-

mally 2, which corresponds to the optimum action of pepsin. In the intestines, on the other hand, it is about 8 or 9 to facilitate the digestive processes that require an alkaline medium. This reaction is not only true of the duodenum but also of the entire intestinal tract.

Acidosis is a condition of lessened alkalinity of the blood and tissues owing to the presence of an excess of acid products, either formed within the body or taken in from without and not destroyed by intracorporeal oxidation. The term is an unfortunate one and in speaking of this condition to the laity it might be better to refer to it as oxydosis. It means the same, but it does not give them the erroneous impression that the blood has become acid, which of course is incompatible with life. pH of blood is 7.4, and an individual's existence permits of very slight reduction from this delicate symbol.

A. E. H.

DR. JAMES GRASSICK

1850-1943

For many years at the holiday season the numerous friends of Dr. James Grassick, of Grand Forks, North Dakota, received greetings in the form of a pamphlet which he himself prepared. This year, only briefly after this Holiday message arrived, and while it was still being read, Dr. Grassick died, on December 19, 1943. His last message was entitled "Out of the Mists," in which he said: "I was born in a secluded glen in the highlands of Scotland, hemmed in by the everlasting hills where mists and shadows were much in evidence. To be out of the mists, meant not only dry footing, but a clearer view of the surrounding landscape, of the heathered hillsides, and gowned meadows and other objects of beauty that were within range."

Born in Aberdeenshire, on June 29, 1850, he soon moved to Ontario, Canada, with his parents. After completing his public school work, he became a teacher and devoted his spare time to the study of medicine in the office of an Ontario physician. When he was thirty-five years old, he graduated from the Rush Medical College in Chicago. He then attended lectures and clinics in the General Hospital and in the Burnside Lying-in Hospital in Toronto. In the fall of 1888 he went to Buxton, North Dakota, where he was engaged in the practice of Medicine most of the time until 1905, when he moved to Grand Forks. On numerous occasions Dr. Grassick did graduate work. In fact, after such work in 1888 the University of Michigan granted him the degree of Doctor of Medicine. In 1904 he traveled through the countries bordering on the Mediterranean, and through Switzerland, Germany, France, Norway, and Great Britain.

In addition to the practice of medicine of that day, Dr. Grassick had an unusual interest in public health, so much so, in fact, that in 1907 he was appointed State Superintendent of Public Health and held that position for six years.

In 1909 he was elected President of the North Dakota Anti-tuberculosis Association and was annually re-elected to this office for more than twenty years. He edited the *Pennant*, a monthly publication devoted to the interest of good health, with special emphasis on the cause, prevention, and cure of tuberculosis. This periodical had a circulation of more than 4,000 copies per month. He was a member of the Board which selected the site for the North Dakota State Sanatorium, and his interest in that institution continued throughout the remainder of his life. In 1917 Dr. Grassick was appointed University of North Dakota Physician, and he conducted what was, in reality, a student health service, having a special dispensary for students. Indeed, he watched over the health of the entire campus and did much to control and prevent epidemics.

In 1923, because of their great admiration and respect for him, and as a recognition of his outstanding contribution in medicine, the North Dakota State Medical Association conferred upon Dr. Grassick its highest honor by electing him to the Presidency. Although the official records of the North Dakota Medical Association were destroyed by fire in 1911, Dr. Grassick set to work to record the history of the Association, which was published in book form in 1926. His chapters on such subjects as the Pioneer Physician, "Doctors" Lewis and Clark, and the Irregulars, are classics. This volume can be read with profit by physicians everywhere.

The concluding sentence of Dr. Grassick's 1943 holiday message is, "Enough, if we are permitted to peer through the mist, catch a glimpse of the stars beyond and point the upward way." This he did all of his life. While helping others to live long, happily and successful, he himself was an outstanding example, having attained the age of ninety-three years.

Book Reviews

Burns, Shock, Wound Healing and Vascular Injuries:

Volume V of Military Surgical Manuals: prepared under the auspices of the Committee on Surgery of the Division of Medical Sciences of the National Research Council; Philadelphia, W. B. Saunders Co., 272 pages, 1943, price \$2.50.

This book presents, in compact form, all the up-to-date essential information for management under military conditions of burns, shock, wounds, and vascular injuries. It provides a basis for which army and navy medical personnel can properly treat casualties in circumstances in which consultations with specialists

are not available. The methods are adaptable to civil emergencies, so that the non-military surgeon can use the book to advantage.

Numerous clear pictures, graphs, charts and tables, as well as case reports, add to the clarity of presentation of the material. In some sections more than one method of treatment is presented step by step, and the special uses and advantages of each discussed, so that the surgeon can choose the technic best suited to each patient. Most chapters are followed by lists of references and other relevant literature.

Discussion is not limited to treatment only but includes information on physiology, histology, and anatomy of the various subjects.

The text is written by a group of doctors, each an outstanding authority, and has been edited by the Committee on Information.

News Items

Dr. R. T. Gammell, of Kenmare, N. D., has given up his practice there and gone to Minneapolis, where he plans to spend a few weeks. While in Kenmare, Dr. Gammell was associated with Dr. D. J. Halliday at the Deaconess Hospital.

Returning to Minnesota from Sisseton, S. D., Dr. Oliver M. Porter has established offices in Willmar. Dr. Porter formerly practiced in Atwater, Minn., and in Minneapolis with the Nicollet Clinic.

Dr. Felix F. Vonnegut has moved his offices from Hague, N. D., to Linton.

Effective on November 1, Dr. Stanley B. Lindley assumed the office of superintendent of the Willmar State Hospital in Willmar, Minn. Dr. Lindley, a graduate of the University of Minnesota medical school, has been assistant superintendent of the Fergus Falls State Hospital for four years.

The following Montana doctors have been accepted into the fellowship of the American College of Surgeons: Halward M. Blegen, Jr., of Missoula; Earl L. Hall, of Great Falls; Otto G. Klein, of Helena; Alfred M. Lueck, of Livingston; Arthur J. Movius, Jr., of Billings; Stuart A. Olson, of Glendive; Arthur R. Sievers, of Butte; and Francis K. Waniata, of Great Falls.

Dr. B. T. Bottolfson, former mayor of Moorhead, Minn., has been granted a fellowship at the Willis Eye Hospital in Philadelphia.

Announcement has been made that Dr. K. F. Bergquist, of Battle Lake, Minn., has been appointed superintendent of the Otter Tail County Sanitarium for tubercular patients.

Dr. W. L. Burnap, of Fergus Falls, has been elected president of the National Conference on Medical Services.

Dr. E. L. Sederlin, of Bismarck, has resigned as acting director of the venereal disease control division of the North Dakota state health department in order to accept a position as assistant health director of Baltimore county, Maryland.

Dr. C. J. Balfour, of Rochester, has been notified that he is president-elect of the Inter-State Post Graduate Medical Association of North America.

The regular December meeting of the Sixth District Medical Society of South Dakota was held on December 17, at St. Joseph's Hospital in Mitchell. Dr. J. C. Ohlmacher, of Vermillion, president of the State Medical Association, spoke on "Medical Problems of Today," and Dr. R. G. Mayer, of Aberdeen, secretary-treasurer of the State Medical Association, presented a scientific paper, illustrated with lantern slides, on "Hematuria."

Officers elected for 1944 include: Dr. W. J. Rieb, of Parkston, president; Dr. J. V. McGreevy, of Mitchell, vice president; Dr. R. A. Weber, of Mitchell, secretary-treasurer; Drs. F. D. Gillis and O. J. Mabee, of Mitchell, delegates; and Drs. C. S. Bobb and F. J. Tobin, of Mitchell, alternate delegates.

Dr. Robert J. Bogan, chief of the surgical service at the United States Veterans Hospital at Fargo, N. D., left recently to fill a similar post at the Des Moines, Iowa, Veterans Hospital.

The first meeting of the American Otorhinologic Society for the Advancement of Plastic and Reconstructive Surgery, Inc., organized for the purpose of spreading education among the professions generally regarding technics related to the art of plastic surgery, was held in New York City in November. The principal speakers were Dr. Romeo Luongo, of Philadelphia, president, and Col. Samuel J. Kopetsky, of New York, both of whom emphasized the fact that too few men are trained for reconstructive surgery, especially in view of the fact that there will be a vast increase in the number of patients as scarred war veterans are discharged from the services. Another speaker, Dr. Samuel Fomon, also pointed out that since there are so few plastic surgeons in practice, the specialists whose fields most nearly touch that of reconstructive surgery are those who are competent, by reason of training and experience, to handle diseases of the ear, nose, and throat.

North Dakota's state health officer, Dr. F. J. Hill, has expressed his approval of the bill now before congress which would provide funds for moving 600 physicians and dentists into areas that are in serious need of medical care.

According to Dr. Hill, there are 3 counties in North Dakota that are now without the services of doctors, and there are 25 counties that have only one physician for populations of from 2,000 to 4,000. Authorities consider a ratio of one to 1,500 to be adequate.

The bill in question calls for an appropriation of \$1,000,000 to be used in locating doctors and dentists in communities in which they are most needed.

The annual meeting of the Black Hills District Medical Society was held in December at St. Joseph's Hospital in Deadwood, S. D. New officers who were elected at the meeting include Dr. William L. Meyer, of Sanator, president; Dr. K. E. Sherman, of Sturgis, vice-president; and Dr. John D. Bailey, of Rapid City, secretary-treasurer.

The speakers were Dr. F. S. Howe, of Deadwood, who presented a paper on problems of childhood, and Drs. D. L. Kegaries, of Rapid City, and P. P. Ewald, of Lead, who discussed the treatment of heart disease.

Members voted to go on record as opposing the Wagner-Murray-Dingell bill.

At a recent meeting of the Sixth District Medical Society in Bismarck, Dr. M. S. Jacobson, of Elgin, was elected president. Other officers are Dr. P. W. Freise, of Bismarck, vice-president, and Dr. W. B. Pierce, also of Bismarck, secretary.

Dr. J. S. Larson, of Fargo, read a paper on nasal treatment, and A. B. Crisler, of Minneapolis, area superintendent of narcotics enforcement for the federal government, talked on the Harrison Narcotics Act as it applies to doctors.

Four thousand capsules of sedatives have been donated by the Medical and Surgical Relief Committee of America to the War Shipping Administration for use in recuperation centers in England and North Africa.

Since injured crew members and shipwrecked survivors need immediate treatment when they land at foreign ports, the Committee has assembled 16 large emergency medical field sets, consisting of drugs, antiseptics, bandages, sutures, syringes, and minor surgery equipment, which will provide the necessary emergency care for merchant seamen.

Under a \$150,000 grant from the National Foundation for Infantile Paralysis, the first center for the scientific study and development of physical medicine as a branch of medical practice has been established, Basil O'Connor, president of the Foundation, has announced. The center will be in the Graduate School of Medicine of the University of Pennsylvania in Philadelphia.

Included in the plan will be a center for the development of physical medicine as a scientific part of the practice of medicine; a training center for medical leaders and teachers in this branch of medicine; and a school for training technical workers under the guidance of professional and scientific leadership, such a school to be only incidental to and dependent upon the first two purposes.

The Departments of Anatomy, Physiology, Pathology, and other basic sciences of the University of Pennsylvania will cooperate in the program. Dr. Robin C. Buerki, Dean of the Graduate School of Medicine, will be in charge of the general direction.

Necrology

Dr. H. J. Skarshaug, 45, of Washburn, N. D., was killed in a hunting accident on November 30, 1943. Dr. Skarshaug, who was health officer of Fargo from 1935 to 1939, was a graduate of the medical school of the University of Iowa. He had served his internship in Los Angeles and had practiced medicine in Decorah, Iowa, for seven years before going to Fargo. He is survived by his wife and three children.

A frequent visitor in Rochester, Dr. R. Fletcher, 65, of Hollywood, Fla., died of a heart attack on Dec. 13. Dr. Fletcher was born in Edinburgh, Scotland, and was a graduate of the University of Manitoba, an institution with which he was connected for several years.

Dr. O. O. Larson, 62, of Detroit Lakes, died on November 7, 1943. His death was due to a heart attack.

Dr. Louis B. Wilson, 76, director of the Mayo Foundation in Rochester for twenty-two years, died in October. Dr. Wilson had come to Rochester in 1905 to establish and develop the laboratories of what later became the Mayo Clinic.

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Advertiser's Announcements

SHOULD VITAMIN D BE GIVEN ONLY TO INFANTS?

Vitamin D has been so successful in preventing rickets during infancy that there has been little emphasis on continuing its use after the second year.

But now a careful histologic study has been made which reveals a startling high incidence of rickets in children 2 to 14 years old. Follis, Jackson, Eliot, and Park* report that post-mortem examination of 230 children of this age group showed the total prevalence of rickets to be 46.5 per cent.

Rachitic changes were present as late as the fourteenth year, and the incidence was higher among children dying from acute disease than in those dying of chronic disease.

The authors conclude, "We doubt if slight degrees of rickets, such as we found in many of our children, interfere with health and development, but our studies as a whole afford reason to prolong administration of vitamin D to the age limit of our study, the fourteenth year, and especially indicate the necessity to suspect and to take the necessary measures to guard against rickets in sick children."

*R. H. Follis, D. Jackson, M. M. Eliot, and E. A. Park: Prevalence of rickets in children between two and fourteen years of age, *Am. J. Dis. Child.* 66:11, (July) 1943.

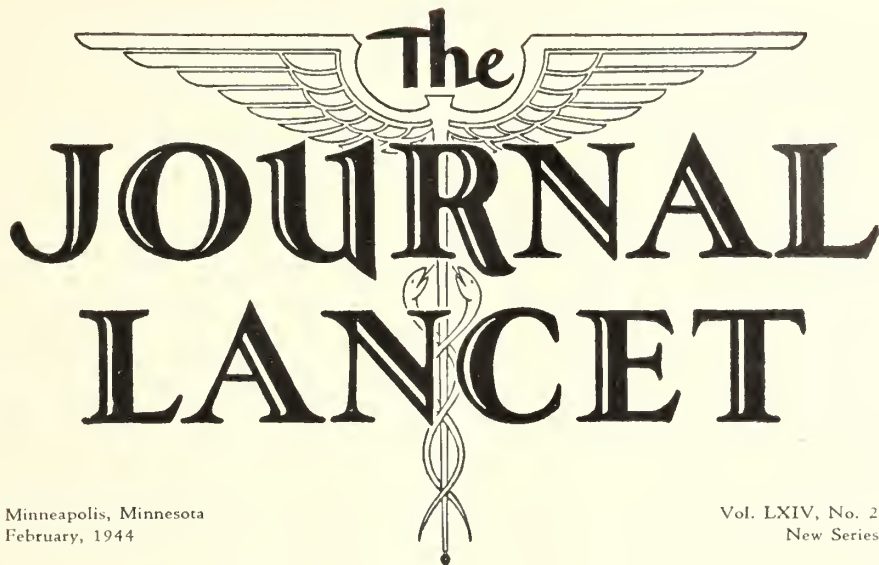
EXECUTIVE CHANGES AT UPJOHN CO.

Effective the first of the year, Donald S. Gilmore will take the presidency of the Upjohn Company, a position occupied by Dr. L. N. Upjohn since 1930. Dr. Upjohn will assume the chairmanship of the board of directors, maintaining his active connection and his general supervision of the company's affairs.

In addition to the change in the presidency of the concern, the board elevated three men long identified with the executive direction of its affairs to vice presidencies. Dr. E. Gifford Upjohn, who has been with the company since 1931 and is now medical director, will retain his present duties as medical director in the post of vice president. Dr. Harold S. Adams, who joined the company in 1926 and has been general superintendent, is vice president and director of production. The third man elevated to a vice presidency is C. V. Patterson, a general sales manager. Mr. Patterson, also placed on the board of directors, now assumes the office of director of sales.

The board named Emil H. Schellack, who with Mr. Patterson has been a general sales manager, the general sales manager of the company. Other officers of the company are John S. McColl, vice president and treasurer; Dr. F. W. Heyl, vice president and director of research; and J. B. Vandenberg, secretary.

Dr. L. N. Upjohn has been with the company since 1904, and was for 25 years head of the New York office. In 1930 he was elected president and took over the actual work of the office when he returned to Kalamazoo in 1931, when Dr. W. E. Upjohn, president and founder of the company, assumed the post of chairman of the board of directors. Mr. Gilmore joined the Upjohn Company in 1930, and in 1936 was made vice president and later general manager, retaining his position of vice president.



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New Series

The Sex Hormones and their Relationships*

Harry O. Drew, M.D.
Billings, Montana

AS our knowledge of the various hormones increases, the interesting chemical relationship between them is becoming more apparent. Not only are the various sex hormones closely related chemically, but there seems to be also a chemical and physiological relationship between the hormones and some of the vitamins. This relationship is so close that in an editorial of the January 1943 issue of *Clinical Endocrinology*, it is suggested that the vitamins be called exogenous hormones and the natural hormones be called endogenous. It is my purpose to try to show the chemical relationship between some of these interesting substances.

We all know that there has been a marked advance in our knowledge of the sex hormones, both chemically and physiologically. A number of them, which several years ago were only postulated, have now been identified and recovered in pure crystalline form. A few have been synthesized. This has brought about a marked change in the treatment of the functional disorders of the gonads and related structures of both sexes.

Clinically, the greatest number of dysfunctions of hormonal origin are in the female. These usually are related to the menstrual cycle and may be due to under-secretion or over-secretion of some one or all of the factors influencing menstruation. I am sure that all of us can remember when crude ovarian extracts or corpus luteum extracts were given as substitution therapy for various forms of ovarian disorders. They were recommended for all of the symptoms of the menopause as well as the various disturbances of the menses from the menarche on. It was reasonable to suppose that if dried thyroid gland

could completely relieve the symptoms of a missing thyroid, dried ovary could completely relieve the symptoms of a castrated woman. It has been proven that this kind of therapy would not work because the problem involved many factors. Most of this type of therapeutics has now proven to be completely ineffective.

If we review the physiology of the menstrual cycle, we find that it follows a definite cycle dependent upon a delicately balanced mechanism regulated by chemical substances. These chemical substances are the true sex hormones of known chemical composition and the gonadotropic hormones of as yet unknown chemical composition.

The generally accepted view of the physiology of the menstrual cycle is summarized as follows: The anterior lobe of the pituitary gland seems to be the starting point, although some authorities seem to think that there is a sex center in the region of the hypothalamus. The basophilic cells of the anterior lobe elaborate a gonadotropic substance which stimulates the growth of the ovarian follicle. This is called by various names but is commonly known as prolactin A. As the ovarian follicle ripens, it produces a hormone called estrone or estrogen. This is the estrogenic substance which stimulates the growth of the glands and epithelium of the tubes and uterus. As the follicle ruptures, the secretion of estrogen reaches its peak and this causes the pituitary gland to elaborate a second gonadotropic substance called prolactin B. This hormone causes the luteinization of the Graafian follicle and the corpus luteum is formed. As the corpus luteum develops it produces the second ovarian hormone, called progesterone. Progesterone further stimulates the uterine

*Presented at the sixty-fifth annual scientific session of the Montana State Medical Association at Billings, July 8, 1943.

mucosa, preparing the uterus for the implantation of the fertilized ovum. If the ovum is not fertilized, the production of progesterone reaches a peak and then rapidly declines. This causes the over-growth of the endometrium to be cast off and results in the menstrual flow. If fertilization takes place, the growth of the endometrium continues with the formation of the decidua. The decidua seems to be capable of producing large quantities of the progesterone-stimulating hormone, which seems to be the same as prolan B. The corpus luteum continues to function until about the seventh month of gestation and then atrophies. The posterior lobe of the pituitary then becomes active and causes the expulsion of the matured fetus at the end of the ninth month. From this very brief resumé of the female sex hormones we can see with what a delicate chemical balance we are dealing.

The generic term applied to the female sex hormones is *estrogens* and that for the male hormones is *androgens*. All of them or their homologues are excreted in the urine. Estrogens as well as androgens are found in the urine of both sexes. In the male the androgenic substances are of course found in much higher concentration than in the females and vice versa for the estrogens. There seems to be a definite relationship in the amount of androgen excreted in the urine and the dominance of the male or female characteristics of that individual. The older some women get, the more androgens they secrete; the older some men get the more estrogens they secrete. There seems to be some reason for the expression "old ladies of both sexes." There are some diseases in which the amount of androgen output is vastly increased as in basophilism and corticoadrenalism.⁷ These conditions are characterized by marked hirsutism and the development of a male configuration in the female. It has been demonstrated by many investigators that when pregnancy takes place, large amounts of prolan B are found in the urine. The presence of this hormone, discovered by Aschheim and Zondek, is the basis of their pregnancy test.

Both androgens and estrogens have been recovered from animal, vegetable and mineral sources and have been synthesized. A number of other chemical substances have been found which either themselves produce the phenomena of stimulation of the sex organs, or which stimulate the secretion of the natural hormones. The degree of estrogenic activity can be checked by its action on the ovarian follicles, the tubal and uterine mucosa, and the vaginal epithelial changes it causes in laboratory animals. We must bear in mind that these estrogenic changes, especially the hyperplasia of the uterine mucosa, come perilously near those caused by carcinoma. Also, in the presence of carcinoma of the genital tract, the gonadotropic hormones are found greatly increased in the urine of both sexes—so much so, that there may be a positive Aschheim and Zondek pregnancy test.^{1,2} These estrogenic changes can be caused by the various isomers of estrone—as estriol and estriodol—by several substances isolated from coal-tar—by substances isolated from plants such as rhubarb, willow catkins, soya beans, etc.—by extracts from certain fish oils—by cortical extracts of the adrenal gland and, strangely enough, by vitamin D or some of its homologues, as ergosterol.^{1,2,3}

We have always been led to suppose that the hormones were substances with a highly specific action and they always produced the same physiological response under all conditions. Here, however, we have substances which can produce two distinct physiological actions. For instance, Dodds has shown that ergosterol, which is a proven antirachitic, will produce estrogenic changes in the laboratory animal.² He has proven that another substance (a coal-tar derivative) cyclo-penteno-benzanthracene, has a dual physiological action. This substance will not only produce estrus but will also produce carcinoma. It is the so-called carcinogenic agent in coal-tar.² Dodds has very aptly called those substances which can produce hormone-like actions but are not of the same chemical composition as the hormones—"hormone skeleton keys." Some of them produce but slight hormone action. When, however, their formulae are changed slightly, they produce more nearly the action of the natural hormones, or in other words, more easily unlock the hormone activity.²

When we examine the structural formula of these substances, we find they are all very similar. The striking thing about them is the presence of the cyclo-pentane-phenanthrene nucleus, that combination of three benzene rings and a five carbon ring which occurs so frequently in the structural formulae of many alkaloids as well as cholesterol (Fig. 1). The three benzene-ring compound phenanthrene is an isomer of anthracene which occurs very commonly in coal-tar. Many of the compounds which contain the cyclo-pentane-phenanthrene nucleus, especially those known as the 17-ketosteroids, give a characteristic color reaction with certain reagents and can be quantitatively analysed.¹¹ While all of the natural sex hormones contain the cyclo-pentane-phenanthrene nucleus, some of the substances which are capable of producing similar action do not. However, it has been proven that the metabolism of the body is capable of changing an open chain carbon compound into a closed chain or ring compound. This has been proven to take place with some of the unsaturated fatty acids, as well as in the formation of hippuric and benzoic acids.² This is probably the type of chemical change that takes place when diethylstilbestrol (the most active synthetic estrogenic substance) is taken into the body. The withdrawal of two molecules of water from the formula diethylstilbestrol could give us a polycyclic compound with dangerous possibilities (see Fig. 2).

The synthesis of the sex hormones is a long and interesting story. I have no intention of boring you with the details. However, it is interesting to note that after some of the sex hormones had been recovered from tissue extracts in sufficient purity to analyze them, it was found that they belonged to the type of chemical substances called sterols. These all have a condensed carbon ring structure arranged in what is known as the cyclo-penteno-phenanthrene nucleus. The carbon atoms of the nucleus are numbered (see Fig. 3). In the true sterols, the No. 17 carbon atom has a long side chain attached (Fig. 4). The sex hormones have essentially the same structure with the exception that at the No. 17 carbon atom there is attached a ketone or an alcohol radicle,

Structural Formulae of Sex Hormones

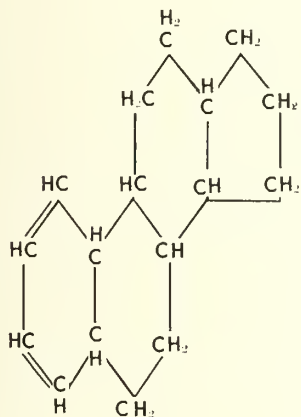


Figure I.
Cyclo-penteno-phenanthrene

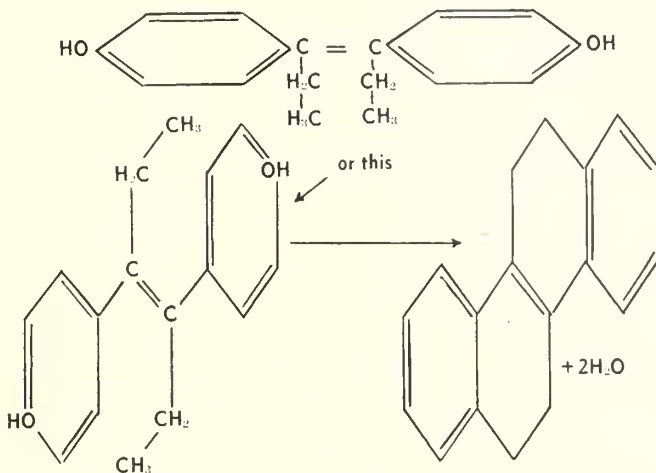


Figure II.
Diethylstilbestrol

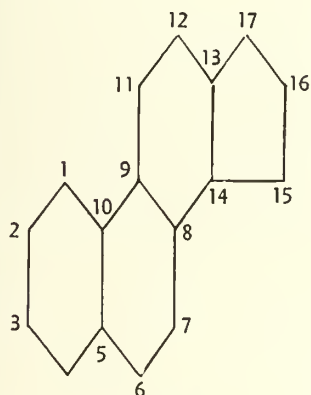
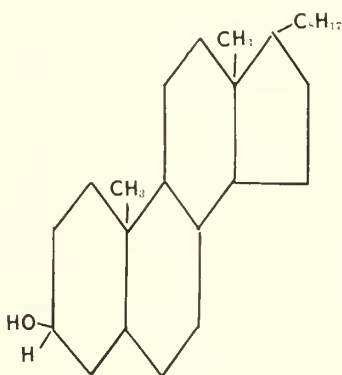


Figure III.
Carbon atoms of the cyclo-penteno-phenanthrene nucleus



Cholesterol

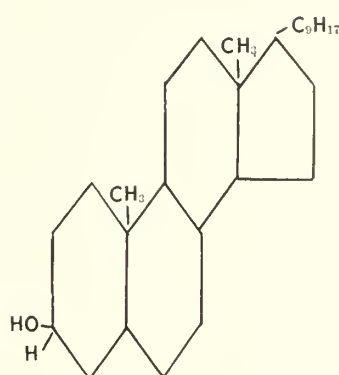
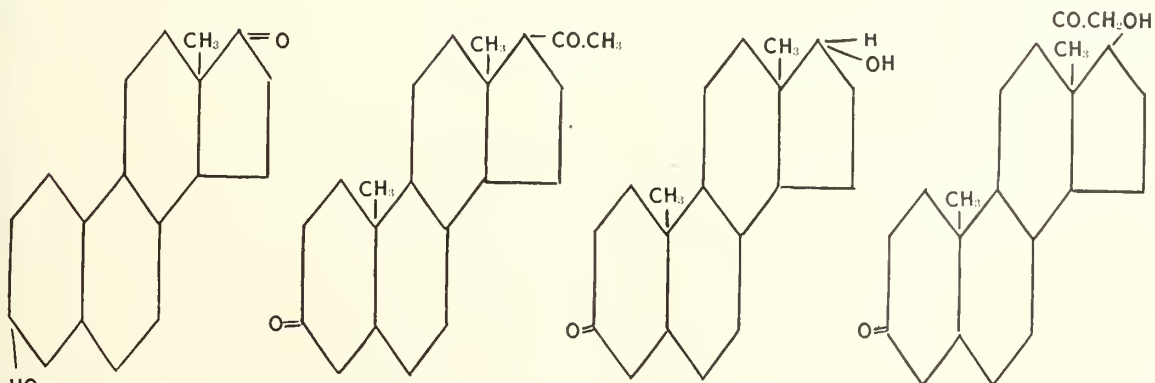


Figure IV.
Ergosterol



Estrone

Progesterone

Testosterone

Desoxycorticosterone

Figure V.

instead of the long side chain.¹⁹ Hence they are called the 17 ketosteroids. By the use of complicated and time-consuming laboratory research work by English, German and American physiological chemists, a large number of androgens and estrogens as well as the adrenal cortex hormone have been synthesized. They usually start with cholesterol or stigmasterol which is a sterol obtained from soya bean. A number of these hormones isolated from human urine seem to be the end products of the metabolism of the natural hormones. Stereoisomerism is a big problem when synthesizing these substances because of the size and complexity of the molecules. Dodds has postulated 32 isomers of estrone.¹⁹

Figure 5 shows the generally accepted structural formulae of some of these substances that I have been discussing. This will give us a fair idea of the marked similarity of the chemistry of all of the 17-ketosteroids. These formulae have been taken from various sources and have been verified by comparison with those given in the 1940 edition of Merck's *Index*.^{2,5,19}

Most of these formulae look alike but they differ markedly in their physiological actions. One of the first questions that occurs is why cannot the chemistry of the body change one hormone to another. For example, let us take the metabolism of fats. They are all composed of the glyceryl esters of palmitic, stearic and oleic acids. Normally, by a series of oxidation processes, they are broken down into CO₂ and water with the liberation of heat. However, in the presence of certain perverted metabolic processes, as in starvation or diabetes, the end products may be oxybutyric acid, diacetic acid or acetone.^{9,10} For instance, the formula for acetone is CH₃.CO.CH₃, and it would not take much imagination to visualize some change in metabolism that would either add or subtract a molecule of acetone to or from some of these hormones and make them look suspiciously like each other. We can easily see how these possibilities intrigue the physiological chemist.

That these changes undoubtedly do occur, has been shown by the work of Cook and his co-workers who have shown that large doses of testosterone increase the normal estrogen content in the urine of males.⁸ It has been known for some time that corticoadrenalism is accompanied by marked increases in both estrogens and androgens in the urine of the victims. Comparing the formula of desoxy-cortico-sterone with that of the sex hormones and especially progesterone, there can be no doubt of the similarity. It would not take much imagination to picture some perverted metabolic process changing one to the other. This must be the explanation of the unusual sexual disorders seen in some cases of corticoadrenalism and basophilism.

The relationship of the sex hormones to a carcinogenic substance of some kind seems to be more than a conjecture. It has been known for a number of years that castration has a beneficial effect in mammary cancer. The presence of carcinoma increases the amount of sex steroids found in the urine. The Aschheim-Zondek test is very often positive in the presence of cancer. There have been reported several cases of carcinoma, especially mammary, which have been apparently caused by the admin-

istration of sex hormones.^{12,13,17} We must also remember the superficial resemblance to cancer of the progestational changes that the endometrium undergoes as a result of the action of progesterone. If we want further evidence that there is some connection between cancer and the sex hormones, we should consider the phenomenal changes which occur in the presence of carcinoma of the prostate when either the androgens are completely neutralized with large doses of estrogens or castration is done. The changes in the original growth and the clearing up of bone metastases is hardly believable. Novak, several years ago said, "The closed door of cancer may be unlocked by an endocrine key."¹

From the fact that the sex steroids so closely resemble each other chemically, there has been a good deal of speculation whether they do not all have a common origin. The fact that castrated males continue to secrete some androgens and castrated females some estrogens, seems to prove that the gonads are not the only source of these substances. In Addison's disease there is a marked diminution of both androgen and estrogen excretion and in corticoadrenalism there is a marked increase.⁷ There is the unquestioned evidence that the various sex hormones are not specific in their action. There are the reports of the progestational properties of testosterone and that pregninonol (a synthetic steroid) has both androgenic and progestational properties.¹⁴ We have previously mentioned the fact that large doses of testosterone seem to be excreted as an estrogenic substance.⁸ The very close relationship chemically of progesterone and desoxy-cortico-sterone has been mentioned. Hamblen seems to think that the adrenal cortex is probably the place where all the sex hormones originate.¹⁴ Cholesterol, which is a component of so many body structures, may be the "mother substance" from which they are all derived by the chemistry of the adrenal gland.

We must not forget the close chemical relationship of both cholesterol and the sex hormones to ergosterol and the natural vitamin D. Here is a possible source of sex hormones. If so, it has far-reaching possibilities, especially as a source of androgens. If we admit that the amount of androgen excreted is a criterion of the maleness of a man, it follows that the fighting ability of an army may depend on the amount of androgen excreted by the individual members. If the androgens depend on the vitamin intake, then diet would play a very important part in the fighting ability of an army as well as the morale of the entire population. An undernourished army or population would not have the hormone stimulus to fight. We do know that diet is a factor in resistance to disease. That there is some scientific foundation for these apparently aimless speculations is shown by the work of Hans Selye. He has proven that undernourishment has a demonstrable effect on the morphology and hormone secretion in the rat.¹⁵ Douglas Sprunt has shown that there seems to be a definite relationship to susceptibility to disease and the amount of sex hormones present.¹⁶ In Selye's experiments in undernourished rats, the size of the adrenals increased as the ovaries atrophied, showing probably that, as the body economy called for greater secretion of desoxy-cortico-sterone to maintain electrolyte and

water metabolism, there was a less need for estrogen formation. This may be an explanation of the frequency of the permanent amenorrhea and the relative sterility of many of the women of central Europe during and following the last war.¹⁶

The treatment of sexual hormone dysfunction should be undertaken only after a thorough physical examination of the patient and an understanding of the normal physiology of these hormones. There are many pitfalls to be encountered in the indiscriminate administration of these powerful agents. We must remember that the entire hormonal physiology is one of delicate chemical balance between closely allied substances. When the commonly accepted dosage of any of these substances is reckoned in tenths of milligrams, it gives us an idea of their potency. To further obscure the picture of hormone dysfunctions, is the question of whether an anti-hormone is not the cause of the apparent under-secretion of the particular substance we wish to give our patient. This subject, which was apparently forgotten for a number of years has recently been brought to attention by several investigators.^{20,21,22} While most of the work on anti-hormones has been done with the thyrotropic hormone of the pituitary gland, Leatham and Abarbanel have shown that there is present in some individuals a substance which neutralizes the action of the gonadotropin of equine origin.²²

The use of androgens to treat various functional disorders in the female, especially menorrhagias and metrorrhagias, as well as symptoms caused by fibromyomas, has met with a good deal of success. Here, however, there is the danger of causing irreversible changes, such as the growth of body hair, atrophy of the breasts and deepening of the voice. The use of the androgens to cause regression of the fibroids has proven to be but temporary and is hardly justified because of the above phenomena.²³ Hamblin condemns the use of any type of androgenic therapy in women because of the danger of the "contrasexual mutilation" it may cause.²⁴

Personally, I think the very close relationship chemically between the sex hormones and some proven carcinogenic substances is significant. If we based our surmises on the cause of malignancy only on the work done with prostatic cancer we would be on quite firm ground. When we consider the reports of the changes estrogen

substances will cause in mammary cancer,^{12,13} and the fact that estrogens can produce uterine fibroids in laboratory animals,²³ we should be extremely careful in the use of all of these substances. I feel that some day the answer to the cause of malignancy will be shown to be due to a perverted metabolism which changes a normal hormone to a carcinogenic one.

I have not dealt with hormone therapy in this paper, but have endeavored to show that the problem is really more complex than we are led to believe by reading "literature" put out by the pharmaceutical houses. Most of the above mentioned literature reminds me of an apt description of some of the articles on the pituitary which were described as "an over-simplification of a complex subject and the unjustified assumption that endocrinologic knowledge has reached the point at which physicians can intelligently prescribe for unintelligible situations."¹⁸

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UROLOGY AWARD

The American Urological Association offers an annual award, not to exceed \$500.00, for an essay (or essays) on the results of some specific clinical or laboratory research in urology. The amount of the prize is based on the merits of the work presented, and if the Committee on Scientific Research deems none of the offerings worthy, no award will be made. Competitors shall be limited to residents in urology in recognized hospitals and to urologists who have been in such specific practice for not more than five years. All interested should write the Secretary for full particulars.

The selected essay (or essays) will appear on the program of the forthcoming meeting of the American Urological Association, June 19-June 22, 1944, Hotel Jefferson, St. Louis, Missouri.

Essays must be in the hands of the Secretary, Dr. Thomas D. Moore, 899 Madison Ave., Memphis, Tennessee, on or before March 15, 1944.

The Celiac Syndrome in Children*

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THE celiac syndrome is defined as a clinical state occurring in infancy and childhood, characterized by chronic intolerance to dietary fat or starch, or both, by the excretion of bulky foul stools and by an enlarged abdomen. There is often marked malnutrition, retarded growth, and evidence of deficiency of one or more vitamins and minerals.

Andersen and Hodges¹ have recently given a classification of the celiac syndrome:

- I. Classical celiac disease or idiopathic steatorrhea, in which the primary defect is in the absorption of fatty acids from the intestine.
- II. Cases in which there is dietary intolerance to starch but not to fat.
- III. Congenital pancreatic insufficiency.
- IV. Chronic mechanical obstruction of the pathways of digestion and absorption.
- V. Cases presenting or suggesting the celiac syndrome but which do not fall into the above groups.

CELIAC DISEASE

Idiopathic Steatorrhea, Intestinal Infantilism, Chronic Intestinal Indigestion, or Chronic Intestinal Insufficiency

Celiac disease was first described in the medical literature in 1888, in a classic paper by Gee.² He described the clinical features, noted the similarity to sprue, and suggested the name, "The Celiac Affection," from the Greek word meaning "belly." The following year Gibbons³ gave a report of several typical cases. Very little appeared in periodicals for a number of years, but, in 1908, Herter⁴ in New York and, in 1909, Heubner,⁵ a German physician, contributed their studies. Herter was interested in the metabolic and bacteriologic studies. Four of his five patients were over seven years of age, and he was impressed with the retardation of their growth, and gave the name, "Intestinal Infantilism," to the disease. In the following span of twenty years, many further contributions were made concerning the metabolic changes and complications.

Pathologic Anatomy. Postmortem examinations have provided no positive evidence as to the nature of the disease process. The usual findings are those of malnutrition, secondary infection, or deficiency from which the patient has died. The most common infections causing death have been septicemia, bronchopneumonia, erysipelas and dysentery. The deficiency diseases have been scurvy, rickets, tetany and purpura due to vitamin K deficiency.

The liver is usually small, and may be fatty. The pancreas is as a rule normal, but may show slight fibrosis of the interlobular tissue. The intestines are usually dilated and often show an increased infiltration of the mucosa

with plasma cells and lymphocytes, which has been interpreted as a reaction to prolonged irritation.

Bacteriology. Herter found that the bacterial flora of the intestinal tract were predominantly gram-positive, which is an abnormal finding for the patients of this age group. The chief organisms were *Bacillus bifidus* and unidentified cocci. With clinical recovery, these organisms were replaced by *Bacillus coli* group. A similar flora has been found, by other workers, in the stools of normal breast-fed infants, and in some normal children. An acid medium is more favorable for the growth of the gram-positive organism, while an acid reaction inhibits the *Bacillus coli* group. It is now felt that their presence in celiac disease is the result of changes in the intestinal content, and has no bearing on the etiology of this disease.

Fat Metabolism. In celiac disease, there is an abnormally large amount of fat in the stools, which is made up of neutral fat, and a great excess of fatty acids and soaps. Most of the excreted fat is split.

In order to obtain data on the amount of fat excreted, one has to know the amount of fat ingested, and the period of collection should be at least over a two-day interval, and the method of assaying the stool must be reliable. The dried stool of a celiac patient on a normal diet contains from 30 to 60 per cent fat, and a normal child's rarely contains more than 20 per cent. The amount of fat excreted, and the proportion of fatty acids to soaps varies with the severity of the disease.

It is generally agreed that defective absorption is the cause of excessive fat excretion. All the known factors necessary for proper fat digestion are present in celiac patients. The bile acids and pigments are present and the normal amount of pancreatic lipase is found. The triglycerids are properly split. The intestinal lymphatics have not been found to be affected. The liver does not contain an excess of fat, as a rule. The fat depots and blood lipids are depleted, as found in prolonged starvation. The finding of a low serum cholesterol (below 140 mg./per cent) substantiates the low total circulating blood lipids.

From the studies of fat metabolism, it is concluded that the primary defect in celiac disease is the failure of fatty acids to pass normally through the intestinal wall.

In the presence of faulty fat absorption, it is natural that deficiency diseases caused by a lack of fat-soluble vitamins should occur. However, except during severe crises, celiac patients can absorb large amounts of fat and fat-soluble vitamins; therefore, deficiency symptoms are found chiefly in cases of long duration, in those with prolonged crises, or in patients treated for a considerable period with a low fat diet, without vitamin supplement.

Symptoms of vitamin A deficiency are rare. Zerophthalmia has been described in the older literature,⁶ but on review of these cases, it seems probable that they repre-

*Read at the annual meeting of the North Dakota State Medical Association, May 10, 1943.

†Northwest Clinic.

sent fibrosis of the pancreas. Some workers^{7,8} found low vitamin A levels in untreated cases of celiac disease. May and McCreary⁹ found normal vitamin A blood levels.

Osteoporosis, rickets, and tetany are by far the most frequent complications explained by failure of the body to absorb fat-soluble vitamin D, with an associated disturbance in the calcium metabolism. The calcium and phosphorus of the blood serum may both be low in celiac disease.

Mineral Metabolism. The normal absorption of minerals from the intestine is disturbed in celiac disease. The calcium combines with the fatty acids, and forms insoluble soaps which are excreted in the stools. Herter⁴ was the first to make careful balanced mineral studies. He found that over a period of ten days, a child with celiac disease retained only 100 mg. of calcium oxide—about one-tenth of the normal requirement. When the patient recovers, there is improved retention.

Iron forms soaps of low solubility. It appears very likely that this immobilizes the iron in the diet and is responsible for the hypochromic anemia so frequently seen in celiac disease.

There is evidence that sodium and potassium are also affected. In a recent case of Andersen's and Hodges¹¹, during a crisis they found very low values for sodium and potassium in the blood serum. Changes in the sodium metabolism are intimately related to water balance, thus explaining the hydrolability seen in these patients, as shown by abrupt changes in weight and hydration. There may be a sudden depletion of the water and sodium stores of the body not unlike a crisis of Addison's disease. The accompanying acidosis is due to a relative excess of chloride in the body.

Carbohydrate Metabolism. A low blood sugar curve after a glucose tolerance test is a constant feature in celiac disease. In the mild cases or the convalescent cases, the curve approaches normal. May and McCreary⁹ have clearly shown the difficulty to be due to abnormal gastrointestinal motility. The glucose, when given by mouth, does not pass through the pyloric valve of the stomach nearly as rapidly as it does in a normal patient. Because of the fact that practically no glucose is absorbed from the stomach,¹⁰ it is obvious that any delay in escape of the glucose from the stomach into the duodenum might affect the character of the blood sugar curve. These same patients were given glucose by the tube directly into the duodenum, which resulted in a more normal glucose tolerance curve in 16 out of 22 cases. In the 6 cases that showed no improvement in glucose absorption, they repeated the experiment but gave in addition, mecholyn with the glucose, and found a considerable rise in the blood sugar, even higher than the normal group. These workers also gave barium with the glucose, and followed it with fluoroscopic examination. When the mixture was given by mouth, a delay in the emptying time of the stomach could be seen. When given by tube directly into the duodenum, the barium tended to collect in large inactive clumps in the dilated bowel, which had lost its normal feathery contour in the jejunum. This is the picture that is so frequently de-

scribed as "clumping" in celiac disease, and causes reduced absorption of glucose.

The dramatic effects of mecholyn on the behavior of the intestine in these patients was interesting and significant. Within just a few moments after giving this drug, the clumping and dilated, inactive small bowel was transformed into an active bowel with normal motility. Along with the improvement in motility, there was a rise in the blood sugar curve.

These studies indicate that there is no specific defect in absorption of carbohydrates by the intestinal mucosa in celiac disease, or in other allied conditions which showed a low blood sugar curve in the glucose tolerance test, but, rather, inactivity in gastrointestinal motility, with inefficient absorption, despite a normal intestinal mucosa. This information brings out the difficulty of interpretation of a glucose tolerance test which depends upon gastrointestinal motility. The glucose tolerance test cannot be expected to be diagnostic of a particular condition, such as celiac disease, but will be affected by any condition altering gastrointestinal motility.

The etiology of celiac disease is unknown. Neither the postmortem nor bacteriologic studies have provided any explanation of the clinical picture. The two most consistent characteristics of all celiac patients remain unexplained, namely, the failure of fat absorption, and the disturbance in intestinal motility. Several theories have been offered in explanation of the poor fat absorption:

1. Pancreatic dysfunction. Deficient lipolysis has been ruled out by evidence that the pancreatic enzymes of the duodenal juice are normal and that the stool lipids are composed chiefly of fatty acids and soaps. It is conceivable that the pancreas normally produces some substance necessary for fat absorption in addition to lipase.

2. Hepatic dysfunction. Bile pigments and acids are present in the duodenal juices and stools. The fact that bile is deficient in something essential for fat absorption cannot be ignored.

3. Dysfunction of the fat absorptive mechanism of the intestinal mucosa. At present this hypothesis appears the most probable one; however, positive evidence for it is scanty. It is possible that some substance essential for the enzymatic process of fat absorption is lacking.

Symptoms and findings. The symptoms rarely develop before the tenth month of life, and more often occur sometime during the second year. The first symptoms are anorexia, irritability, listlessness and improper gain of weight on a normal diet. The stools are large and bulky, being loose, but not watery, pale in color, at times frothy due to fermentation, greasy in appearance due to the high fat content, and usually very foul smelling as a result of putrefaction. The physical findings depend upon the stage at which the disease is recognized. When recognized in the second or third year of life, the patient presents a characteristic picture. The facial expression is one of sadness or dejection. The face is often plump, and it is not until the patient is undressed that one sees the marked contrast of severe emaciation of the trunk and extremities. The abdomen is markedly protuberant, and, in contrast, the buttocks are flattened due to atrophy. The skin hangs in folds and is inelastic. There is

often evidence of secondary infection of the upper respiratory tract.

When a celiac crisis occurs in the severe cases, it provides days of anxiety for both the family and the physician. It may occur without cause, or more often is preceded by an upper respiratory infection or a dietary indiscretion. At first there is a day or two of increased listlessness, irritability, and the loss of $\frac{1}{4}$ to $\frac{1}{2}$ pound of weight. This is followed by a sudden weight loss of often two to four pounds, with the appearance of enormous, watery, foul stools. Accompanying this are oliguria, polydipsia, drowsiness, fever and acidosis. In most instances, the patient improves when given a high fluid intake, with part of the fluid given parenterally. It may take weeks or months for the patient to regain his weight and strength following a severe crisis.

Laboratory findings. A marked secondary hypochromatic anemia is usually present. Associated, also, is a leukopenia. The stool examination shows an abnormally high water content, usually over 85 per cent as compared with a normal figure of 70 to 75 per cent. The fat may comprise more than 50 per cent of the dried weight. Microscopically, many fat droplets are seen and usually many undigested meat and vegetable fibers. During a diarrhea, occult blood is found and occasionally gross blood is seen in the stool.

X-ray examination. Kantor¹¹ states that roentgen findings may be of great diagnostic importance. He summarizes them in the following table:

1. In the small intestine—"Moulage sign," dilatation, segmentation.
2. In the colon—Dilatation and redundancy.
3. In the gallbladder—Faint filling.
4. In the bony skeleton—Osteoporosis, deformity, and dwarfism.

In an active case of celiac disease, the mucosal changes as shown by x-rays are striking. They take the form of coarsening, or ironing out, of the valvulae. They are far more evident in the jejunum and even in the distal duodenum, where the valvulae are normally more prominent. In an advanced case, the obliteration of the valvulae may be so complete that the roentgen appearance of the bowel resembles a tube in which wax has been poured and allowed to harden. Kantor has suggested the descriptive term "Moulage sign." This condition is present only in the active phase and disappears in the period of remission or convalescence. It may therefore serve not only as an aid in diagnosis, but in prognosis as well.

In addition to the disappearance of the valvulae, there may be dilatation of the small bowel lumen and spasm, which is called segmentation. Due credit for the original observation of these roentgen findings must go to Camp and Snell,¹⁷ who in 1934 reported four cases with x-ray findings and suggested the cause might possibly be due to "an inflammatory condition with edema and infiltration of the walls." Later Golden¹³ observed typical small intestinal changes in seven of eleven cases of celiac disease.

Bone changes may show evidence of deranged calcium metabolism. In some cases there is cessation of growth, and osteoporosis is usually present. In the prolonged un-

treated cases, growth may be resumed and rickets appear. Changes in the large bowel have been described, usually as ptosis, elongation or dilatation of the colon. When present, these are usually due to distention by an excessive volume of feces.

Prognosis. A child with this disease must face a long and discouraging illness. It may require one or more years of relapses and remissions before the child is well. The duration of the disease seems to be directly proportionate to the interval elapsing before the patient was given adequate care. In the early reports of this disease, the mortality was stated to be up to 50 per cent, but with present day knowledge of the disease, the mortality rate is much lower. The improvement in mortality rate is due to: (1) more prompt and adequate treatment of crisis, (2) control of intercurrent infections by chemotherapy, (3) better understanding of secondary vitamin deficiencies.

Treatment. The management of the celiac crisis constitutes a true emergency. The patient must be placed in a hospital and immediate care given. The first efforts must be directed to correct the dehydration and combat the acidosis. If possible, determination of the plasma carbon dioxide combining power should be carried out. If there is a severe acidosis, one-sixth molar sodium lactate solution is given intravenously in the amount of 10 cc. per pound of body weight, and 20 cc. per pound of body weight, subcutaneously.

When there is no acidosis present, normal saline or 5 per cent glucose in distilled water may be given subcutaneously to replace lost body fluids. After the patient is hydrated, a dilute formula fortified with banana powder may be given by mouth. If edema is present due to loss of body protein, a transfusion of plasma or whole blood is advisable.

At times a crisis is precipitated by a parenteral infection; therefore, a careful search should be made of such foci, if necessary, chemotherapy may be instituted. When the crisis is over the caloric intake may be gradually increased and from this point on the treatment is dietary.

In some cases the fat content of protein milk is not tolerated; in that event skimmed milk may be used, fortified with banana powder. Tomato juice or orange juice may be given early in the course of treatment, as well as ripe bananas. Cottage cheese may be given if it is made from skimmed milk.

If the patient tolerates the above mentioned foods, pureed vegetables may gradually be added, followed by scraped beef liver, chicken and lean lamb. Egg whites may be fed coddled. Next in order is scraped apple, or other fresh fruits and other vegetables. Then zwieback or toast, at first only a half slice a day. Cooked cereals and potato are then introduced, but very cautiously. The last addition is whole milk, butter and egg yolk. It is best to add only one new food at a time, then wait a week or ten days before the next change. Should the patient develop typical celiac stools during the introduction of a new food, that food must be withheld from the diet until the stools are normal again, then with caution the offending food is tried again.

In the usual celiac patient it takes from one to two years before a normal diet is tolerated.

STARCH INTOLERANCE

This is included in the celiac syndrome because it is a nutritional disturbance of infancy and early childhood, with evidence, both clinically and by laboratory tests, of an intolerance to starch, but not to fat. In order to make this diagnosis, the following criteria must be fulfilled:

1. History of periodic episodes of large foul stools, usually associated with an upper respiratory infection.
2. A low level of amylase in the duodenal juices, (ranges from 0 to 40 per cent of normal).
3. Not an excessive amount of fat found in the stools when patient is on a normal fat intake.
4. Excessive starch in the stool, as found microscopically and chemically.
5. Favorable response to low starch diet.

Nothing is known of the pathology of this condition. Bacteriologic studies fail to reveal any consistent organisms in either throat or stool cultures. Fat metabolism seems to be entirely normal. Serum cholesterol is normal, whereas it was low in celiac disease. The glucose tolerance test is often low, which is due to abnormal intestinal motility. The decrease in amylase is not the result of infection of the upper respiratory tract, since the amylase has been found to be normal in a series of cases convalescent from pneumonia, without an associated diarrhea. The amylase has been found to be normal in cases of celiac disease also. The clinical features of this condition of starch intolerance, usually beginning in the first year of life, with a diarrhea and an associated upper respiratory infection. These patients have frequent upper respiratory infection, at times progressing to a bronchopneumonia. Physical findings are not striking. Patients usually are pale, inactive, and appear chronically though not seriously ill. The abdomen is protuberant, but muscles have a good tone. The buttocks are not flattened as in celiac disease. There is usually evidence of an upper respiratory infection or its sequellae, otitis media.

Treatment. A diet low in starch but normal in fat and protein content gives excellent results. An excessive increase in starch in the diet may not result in typical stools until a week or more has elapsed. During periods of upper respiratory infections, starch should be reduced or eliminated.

Clinical recovery on a low starch diet may be expected in several months, but normal tolerance to starch requires more than a year.

CYSTIC FIBROSIS OF THE PANCREAS

(Congenital Steatorrhea, Congenital Pancreatic Deficiency)

Knowledge of congenital pancreatic fibrosis as a disease entity is fairly recent. The gross appearance of the pancreas has led to delayed recognition of the pancreatic lesion. Also, because these patients usually die of a respiratory infection, the clinical recognition has been delayed because of attention focused on the chest condition, and death usually occurred before any nutritional difficulties became obvious.



Fig. 1.



Fig. 2.

In older infants and children, confusion results because of the close similarity between the clinical picture of this disease and celiac disease.

The earliest case recorded in which there was a congenital digestive disturbance associated with a proved pancreatic lesion was reported by Passini¹⁴ in 1919. This child had abnormal stools from birth and died at the age of 9 months of bronchopneumonia. At postmortem examination, a fibrotic pancreas with acinar cysts was demonstrated. A sibling who died at two months of age was found to have a similar pancreatic lesion.

In 1938, Andersen¹⁵ reviewed the reported cases, added her cases and analyzed the series of 49 cases of pancreatic fibrosis proved by postmortem examination.

The pancreatic deficiency and consequent steatorrhea are considered the cause of the vitamin A deficiency; the changes in the bronchial and tracheal mucosa probably result in the respiratory infections which cause death in all cases. The diagnosis may be confirmed by examination of the duodenal juices for pancreatic enzymes. Recently the defective absorption of vitamin A has been demonstrated by means of vitamin A absorption tests.^{16,17,7}

The flat glucose tolerance curve in these patients is the result of abnormal gastrointestinal motility, such as occurs in celiac patients.

The pathologic picture of the pancreas shows obstruction of the large and small ducts. There is a diminished amount of acinar tissue and between the lobules there is a proliferation of fibrous tissue. The Islands of Langerhans remain intact.

Symptoms. The usual history is that the infant appeared normal at birth, and did well for a period of a few weeks to months. It would then be noticed that the infant would fail to gain in weight, yet his appetite would be very good. Stools would become large and



Fig. 3.

foul, especially after cereal had been added to the diet. These patients as a rule have frequent colds.

Nearly all the cases when seen after the age of six months were considered to have celiac disease, and would be put on that type of treatment with more or less benefit. The physical appearance of these cases is similar to the celiac patient.

The only helpful laboratory test to differentiate cystic fibrosis of the pancreas from celiac disease is to examine the duodenal juices. In the case of cystic fibrosis of the pancreas, the pancreatic enzymes will be absent, whereas in celiac disease they are present.

Treatment. As yet, this is in the experimental stages, but at present these patients are placed on a diet very similar to that of a celiac patient. Two differences are of interest; first, experience has shown that hexose and possibly sucrose can be utilized, but starch cannot; secondly, a moderate amount of fat can be utilized with the aid of pancreatin, and in this way some of the fat-soluble vitamins are absorbed. The diet should be high in protein, moderately low in fat, and free from starch, but not sugars. Milk prescribed is usually protein milk sweetened with banana powder or honey. Pancreatin is added in dosages of one gram for six ounces of formulae. Oral administration of vitamin A in the form of oleum percomorphum, 15 drops three times a day, is found more advantageous than parenteral administration of vitamin A concentrate. Orange juice or some other form of vitamin C should be given daily. At eight months of age, ripe bananas, cottage cheese, egg, scraped beef liver, and

vegetables, such as spinach, carrots, and peas, are tolerated well.

Prevention and control of all respiratory infection is very important, because when bronchopneumonia is once well established it responds poorly to treatment.

CASE REPORTS

Case 1. J. L., 23 month old female. Present Complaint: Loss of weight and appetite past two months, associated with abnormal stools. Present Illness: Onset at age of 21 months when she began having abnormal stools, described as being large, frothy, soft, gray and foul smelling. Her appetite was very poor and she had lost weight the past two months. Best weight before onset was 30 lbs.

Physical Examination: Markedly malnourished white female. Weight 18 lbs. 10 oz. (see Fig. 1). Examination negative except for large protuberant abdomen, marked wasting and flattening of buttocks and extreme malnutrition.

Laboratory Data: Hb. 75 per cent, WBC 11,800. Differential, PMN's 45 per cent. Lymphocytes 50 per cent, monocytes 4 per cent, eosinophils 1 per cent. Urine, sp. gr. 1.019, acid in reaction; trace of sugar, 15 mg. albumen per 100 cc.; sediment—occ. RBC and leukocyte. Agglutination test negative for undulant fever. Stool analysis 1+ benzidine for blood, 1+ starch, 4+ neutral fats and fatty acids.

Diagnosis: Celiac disease.

Treatment: Placed on celiac diet. After 2½ months of treatment patient had gained 4 lbs. Five months of treatment, weight 25 lbs. 8 oz., gain of 7 lbs. (see Fig. 2); bowel movements normal. Fifteen months of celiac management, weight 28 lbs. 10 oz., a gain of 10 lbs., only 1½ lbs. below average weight calculated for her age and height.

Case 2. C. C., male, age 11 years. Admitted to Trinity Hospital 5-10-41; discharged 6-2-41. Entrance Complaint: Retarded growth and pains in calves of legs. History: Obtained from father. States patient was a normal infant, weighing 8½ lbs. at



Fig. 4.

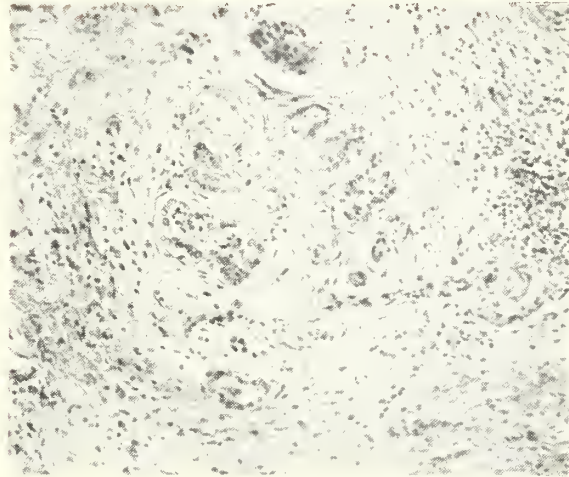


Fig. 5.

birth. Breast-fed first nine months. Developed normally up to 18 months. From that age up to the present he was retarded in his growth. At the age of 8½ years he developed a diarrhea, having four or five large, loose, light-colored stools each day. Following this, at 9 years of age, he began to have spasms of his hands in which the thumb would be held tightly against the palm of the hand, and the fingers in rigid extension. When 9½ years old, he complained of severe cramps in the calves of both legs, often hurting so much that he could not walk. The last two years he had lost weight and his abdomen had become larger.

Physical Examination: Weight 49¾ lbs., height 48 inches. Positive physical findings: (1) Below average in weight and height, (2) enlarged abdomen, (3) flattened buttocks, (4) positive Chvostek's sign, (5) positive Trousseau sign. (See Fig. 3).

Laboratory Data: Hb. 58 per cent; RBC 4,660,000; WBC 8,700; urine negative; stool has excessive amounts of fat and starch; Kahn negative; tuberculin test negative; blood calcium 6.7 mg./per cent; phosphorus 3.1 mg./per cent; PSP test showed 75 per cent excreted the first hour, 5 per cent the second hour; glucose tolerance test gave very flat curve; fasting blood sugar 74 mg., ½ hour 70.9 mg., one hour 85.4 mg., two hours 70.9 mg., three hours 68 mg. X-ray of wrists showed chronic rickets.

Diagnosis: Celiac disease. Retarded growth and tetany due to loss of calcium in stools.

Progress: Patient placed on celiac diet, Drisdol, *oleum percomorphum*, and calcium gluconate. On 5-28-41, eighteen days after admission his blood calcium rose to 9.3; phosphorus 3.4; unable to elicit Chvostek's sign at this time. Patient returned for check-up. No tetany past five months. Has one or two bowel movements each day which are of normal consistency; weight 52½ lbs.; abdomen much less prominent; buttocks filled out; blood calcium 10 mg./per cent, phosphorus 2.7 mg./per cent. Whole milk and most vegetables added to diet.

Case 3. J. C., male, age 11½ months. Admitted to Trinity Hospital 12-3-41; expired 12-8-41. Entrance Complaint: Cough, rapid labored respirations and fever. Present Illness: Patient has had an upper respiratory infection for three weeks. The day before admission breathing became labored and rapid. History: Past history—birth weight 6 lbs. 15 oz. During the neonatal period bowels moved from four to twelve times every 24 hours. Patient seen each month. Mother always stated that the infant had from four to seven bowel movements a day, and since Pabulum and vegetables were added to the diet the stools were of larger volume, pale in color, frothy and foul smelling. At 8 months the abdomen was quite large. At this time he was weaned and given equal parts of evaporated milk and water. We suspected an early celiac disease might be de-

veloping. At 9 months of age a stool was examined and revealed 4+ starch, but no fat or fatty acids. During the next month the patient lost one pound in weight. Starches were taken out of the diet and cream removed from milk. Ripe bananas given. Under this treatment the patient gained 10 ounces in ten days and had from one to three stools per day. However, he developed an upper respiratory infection which led to his hospital admission.

Physical Examination: The patient had an acute bronchitis and bilateral bronchopneumonia. He failed to respond to chemotherapy and a blood transfusion, expiring five days after admission.

Clinical Diagnosis: Bronchopneumonia and early celiac disease. At postmortem examination, the only gross pathology found was the pneumonia. However, on microscopic examination of the pancreas, the pathologist, Dr. Paul J. Breslich, reported as follows (See Figs. 4 and 5): Histology: The lobules of the pancreas are almost completely replaced by scar tissue which is diffusely and densely infiltrated with small round cells. There is also a considerable number of epithelioid cells and polynuclear leukocytes. No normal acinar tissue is identified. The scar contains many hugely dilated ducts lined by cuboidal epithelium and filled with a pink granular precipitate. Occasionally polynuclear leukocytes are discovered embedded in the precipitate. Contained in the scar tissue are many islets of Langerhans. The number of islets is apparently increased as a result of the shrinking of the pancreatic lobules. There are no noteworthy changes of the islet cells. Pathologic Diagnosis: Chronic fibrous pancreatitis with complete destruction of the acinar tissue of the gland. Final Clinical Diagnosis: Cystic fibrosis of the pancreas with terminal bronchopneumonia.

I wish to thank Dr. Paul J. Breslich, pathologist, of Trinity Hospital, Minot, North Dakota, for his aid in preparing this paper.

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Hematuria and Its Significance*

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HEMATURIA is one of the more common symptoms of urinary tract disease and in this section of the country its importance is frequently underestimated or neglected by the patient and sometimes by his doctor. Usually, however, the presence of gross blood in the urine alarms a patient and sends him to his physician. Small amounts of blood in the urine will not be noticed by the patient and can be distinguished only by microscopic or chemical tests. As the blood increases in quantity, it may be distributed throughout the urine giving it the characteristic smoky color which increases to a deep red. Blood may coagulate in the kidney, ureter or bladder and be expelled in the form of clots.

Women are more apt to ignore hematuria than men since they are accustomed to seeing blood mixed with urine during menstrual periods. If they develop frequency, burning, and pain on urination, however, they usually consult their physician.

It is unfortunate if hematuria is treated expectantly by the physician. This should never be done because in most cases blood in the urine indicates a serious disease, which, if diagnosed early in its course, can frequently be cured.

In any disease of the urinary tract, much can be learned from a three-glass urine test. In hematuria some idea of the source of the blood can be gained by such an examination. If the bleeding arises distal to the external sphincter, blood may flow from the external meatus and the first glass of urine will be bloody and the second and third relatively clear. If the bleeding point lies between the internal and external sphincters, there will be no bleeding between voidings, but the first glass of urine will be bloody with the second and third relatively clear, provided the bleeding is moderate in amount. If bleeding is excessive and the posterior urethra becomes filled, some blood may leak through the internal sphincter so that bladder urine will be bloody and the second and third glasses may be bloody also. The third glass of urine may be more heavily charged with blood than the second glass owing to the compression exerted at the end of urination by the muscles emptying the urethra.

Blood coming from above the vesical sphincter, wheth-

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er its source is the kidney, ureters or the bladder, is usually mixed with the bladder urine and all three glasses of voided urine will appear equally mixed with blood. Occasionally the final contraction of the bladder muscle may squeeze some additional blood from a tumor or other lesion, producing terminal hematuria.

When all three glasses of urine are blood stained, the main diagnostic points to rely upon are the presence of worm-like ureteral casts of blood-clot which are pathognomonic of bleeding above the bladder, and the presence of blood casts or cylinders seen microscopically which are pathognomonic of bleeding from the renal parenchyma.

In diagnostic examinations it should be remembered that the passage of an urethral or ureteral catheter may cause traumatic bleeding and such a catheter urine specimen containing blood does not necessarily indicate the source of bleeding.

The proper investigation of any case of hematuria includes careful history and physical examinations, endoscopy and cystoscopy and continued with intravenous urograms, retrograde pyeloureterograms, chemical and microscopic examinations until the source and cause of bleeding are established beyond doubt. During cystoscopy the observation of spurts of bloody or clear urine from the ureteral orifices is often more valuable than catheterization in determining which side is bleeding.

MacKenzie¹ in 1932 discussed hematuria in urological patients admitted to the Royal Victoria Hospital in Canada. He stated that 20.24 per cent of urologic admissions passed urine containing blood and in 75 per cent of these, the blood was caused by tumor, infection, calculus or nephritis. In his cases with hematuria, causative lesions were found in 96 per cent and over 40 per cent were neoplasms. Cahill² and Higgins³ have discussed hematuria and give the following tabulation and grouping used at the Cleveland Clinic in Cleveland, and the Presbyterian Hospital in New York, in classifying cases with hematuria.

I. Hematuria in general disease:

- A. Acute fever: Tonsillitis, scarlet fever, rheumatic fever, etc.
- B. Chronic infections: Endocarditis (renal infarction), malaria.

- C. Blood dyscrasias: Purpura, leukemia, hemophilia, polycythemia vera.
- D. Deficiency and dietary disease: Scurvy and liver deficiency.
- E. Diseases of unknown etiology: Hodgkin's disease, hypertension or arteriosclerosis with renal involvement, periarteritis nodosa.
- F. Following medication: Sulfonamides, methanamine, salicylates, barbiturates, mandelic acid, etc.

II. Hematuria due to intrinsic disease of the urinary tract:

A. Renal

1. Calculi or crystals
2. Nephritis
3. Tumor—capsular, parenchymal, pelvic
4. Infection—acute or chronic, including tuberculosis
5. Anomalies—polycystic disease, horseshoe kidney, nephroptosis, etc.
6. Trauma

B. Ureteral

1. Calculi
2. Infection
3. Stricture
4. Tumor

C. Vesical

1. Tumor
2. Infection
3. Calculi or foreign bodies
4. Ulcer
5. Trauma

D. Bladder neck

1. Prostate, including seminal vesicles

E. Urethral

1. Infection
2. Stricture
3. Tumor
4. Following instrumentation.

III. Hematuria associated with extraurinary pathology:

- A. Acute appendicitis
- B. Diverticulitis of the colon
- C. Neoplasm of the colon, rectum, or pelvic structures
- D. Acute or chronic salpingitis.

I. HEMATURIA IN GENERAL DISEASE

The acute and chronic diseases usually produce bleeding from the urinary tract in small amounts so that blood is found on microscopic examination and is an incidental finding. Other signs and symptoms will usually point to disease outside of the urinary tract.

Blood disease and diseases of the circulatory tree may produce hematuria and this may be the first sign and the only local manifestation of the underlying disease.

The extensive use of methanamine, mandelic acid, barbiturates, and sulfonamides by physicians and surgeons makes the frequent examination of urine imperative, since the appearance of blood in the urine usually is the signal for discontinuance of the drug. If hematuria is overlooked the patient may become acutely ill as a result of continued use of the drug.

II. HEMATURIA DUE TO INTRINSIC DISEASE OF THE URINARY TRACT

The detection of the source of bleeding may be fairly easy if the lesion is in the lower portion of the urinary tract because of the accessibility to urethroscopic and cystoscopic inspection. However, when the source of bleeding is above the bladder, a prolonged search may be necessary. If one visualizes in a diagrammatic manner the various lesions in the urinary tract which can give rise to hematuria and then employs every diagnostic measure in a routine manner, the data gathered together will usually show the correct diagnosis. By such a procedure frequently more than one lesion may be found.

The general history and physical examination indicating the presence of other signs and symptoms such as pain, loss of weight, chills, fever, the history of trauma, and the presence of a mass, may point to the cause of bleeding. Chemical analysis of the blood is an early test to be performed, since with a high blood urea one will be cautious in performing cystoscopic examinations and pyelograms. Intravenous urograms are to be highly recommended in cases of upper urinary tract bleeding. They give good indications of the degree of renal function and if carefully performed can be expected to cause little or no local or systemic reaction. With intravenous urograms, the kidney outlines, calices, pelvis, and ureters are usually outlined as well as or better than retrograde pyelograms or ureterograms. Where doubtful shadows are cast, retrograde studies will be necessary, but in such instances much discomfort will have been eliminated for the patient.

III. HEMATURIA DUE TO LESIONS OF STRUCTURES ADJACENT TO THE URINARY TRACT

With infection in the intestinal tract such as appendicitis and diverticulitis and with acute and chronic infections in the tubes, ovaries and pelvic structures, hematuria may occur, since the inflamed organ may come to lie upon the ureter or bladder and the resulting inflammation cause blood cells to appear in the urine. However, clinical evidence points to the fact that in such cases the hematuria is likely due to a hematogenous infection of one or both kidneys, producing an acute or subacute glomerulonephritis.

CONCLUSIONS

The object of this discussion is to draw attention again to the serious significance of blood in the urine.

For the patient or his doctor to treat the condition casually or expectantly is dangerous. Hematuria is one of the early signs of tumors and inflammations, conditions which require early treatment if satisfactory results are to be obtained. Careful, detailed urological investigation permits early interpretation and treatment.

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Low-Dosage Roentgen Therapy for Amenorrhea and Sterility*

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ROENTGEN irradiation of the hypophysis and ovaries for the correction of certain types of amenorrhea has been reported as an effective measure in women of childbearing age. In order to determine the usefulness of this type of therapy in our own hands, a study was made of 45 patients treated at the Fargo Clinic in the past six years.

Of the total 45 patients treated, 40 had amenorrhea of from three months to five years' duration. Five patients were treated for hypomenorrhea. Of the 40 patients with amenorrhea, only 30 were traced and provided adequate follow-up records for comparative study. Following x-ray therapy, 20, or two-thirds, of these patients reported regular menstrual periods with one to three pads used per day. Eight patients had scant or irregular periods. Only one of these patients could be classified as having the primary type of amenorrhea. She was an 18 year old girl, who was treated in 1941 and is now menstruating regularly.

Since only 5 patients with hypomenorrhea were treated, the results are less definitive. It is suggested, however, by the fact that the menses of 4 of the patients were unaltered, that this form of therapy is less effective in hypomenorrhea.

Results of Low-dosage X-ray Therapy in Amenorrhea of 3 Months' to 5 Years' Duration

Menses	No.	Pct.
Regular. 1 to 3 pads per day	20	67
Scant or irregular periods	8	27
Occasional scant period	1	3
No menses	1	3
Total	30	100

Ten of our patients with amenorrhea or hypomenorrhea were also sterility problems of from two to thirteen years' duration. Of these 10 patients, 8 have had one or more full-term pregnancies since treatment. Three of the sterility problems had been pregnant before their amenorrhea.

Sterility and Amenorrhea (Duration 2 to 13 Years)

	Number Treated	Pregnant Since Treatment
Sterility and amenorrhea	9	7
Sterility and hypomenorrhea	1	1
Total	10	8

The mechanism by which menstruation is initiated by irradiation is not completely understood. The theories that x-rays act by directly stimulating the granulosa cells or that they may destroy a persistent corpus luteum are unproved. The most tenable explanation, in the light of recent observations¹ on the effect of small doses of radiation in inflammatory conditions, is provided by the fact that an active hyperemia is produced in the irradiated area, thereby possibly improving the nutrition of the

*Presented at the fall meeting of North Dakota Society of Obstetrics and Gynecology at Devils Lake, October 16, 1943.

ovary. Although the mode of action remains debatable, the fact remains that roentgen therapy has proved of definite value in the cases here reported.

That small doses of x-radiation to the ovaries prior to conception is harmless is no longer debatable. Some writers, however, have suggested that damage to the genes and chromosomes may be evident in later generations. Drips and Ford³ found no anomalies in the second and third generations of rats which had been subjected to irradiation. DeLee and Greenhill⁵ summarize the current opinions on the safety of small doses of x-ray by stating that there is no apparent immediate harm from irradiation and whether any remote adverse effects will appear from such treatment is theoretical.

The microscopic study of ovaries previously irradiated with small doses of x-rays was undertaken by Wagner and Schoenhof (as quoted by Mazer and Goldstein.²) In 38 young women, for whom panhysterectomies were planned because of early carcinoma of the cervix, they applied small doses of x-radiation to one side of the pelvis. During the treatment an attempt was made to shield the opposite ovary. Several weeks later at operation, the histologic picture in the irradiated ovary was exactly like that of the control ovary in every patient. There was no evidence of damage or degeneration as a result of the irradiation. Actually there were more follicles of equal maturity in the irradiated ovaries than in those that were protected during the treatment.

CONTRAINDICATIONS

Patients should be accepted for treatment only after thorough study by a competent gynecologist. In general, this type of treatment should not be used where amenorrhea is due to factors unrelated to pituitary or ovarian dysfunction, such as local or constitutional organic disease. It should not be used in amenorrhea caused by pelvic inflammatory disease or amenorrhea resulting from unilateral oophorectomy. Pregnancy must be positively excluded before exposing the pelvis to x-radiation. To avoid conception while treatment is in progress, sexual relations should be banned until the last treatment is completed. Only a skilled roentgenologist should be entrusted with the treatment because the difference between a harmless and harmful dose to the ovaries must be thoroughly understood.

The technic which we have employed is similar to that of various workers who have found it to be harmless but effective. Roentgen rays generated at 200 KVP filtered with 1/2 mm. Cu. plus 1 mm. Al., HVL 1.1 Cu. with a target-skin distance of 50 cm., are directed through one large anterior pelvic field for a dose of 75 to 150 roentgens (as measured in air), the size of the field and precise dose depending upon the size and thickness of the

patient. At the same visit a similar dose is directed to the hypophysis through a 5 cm. round field. Three such treatments at weekly intervals complete the series. It may require four to eight weeks for menses to become manifest. If the treatment is not effective within six weeks after the last exposure, we usually consider it to have failed. If the single series of three treatments is not effective, further irradiation is not considered advisable.

In conclusion we wish to state that we have been impressed by the utility of x-ray therapy in amenorrhea. When indicated and properly administered, it provides a method of treatment which is both satisfactory to the physician and often gratifying to the patient.

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A Discussion of Some of the Newer Drugs*

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THE average physician today, loaded with added duties, with time for reading and study woefully cut down to less than the bare minimum, and deluged with reports of new therapies, is enveloped in a sort of fog of therapeutic ideas. Uncertain as to the real value of newly recommended therapies, he is inclined to do one of two things; either haphazardly try all things new, or totally disregard them. Glowing reports of new therapies in the daily press and popular magazines, which often appear before the originators would like, bring pressure from the lay public which adds greatly to the confusion.

All therapies of real value must have some basis in scientific cause and effect. The real test is the clinical trial, and clinical trials are slow. Real value of a new therapy may be hinted in a brief trial, but the burden of proof is carried by extensive and numerous investigations.

All too often there is a tendency to use a new therapy as a panacea. This is unfortunately the case at present with sulfonamides and the vitamins.

The therapies discussed in this paper are divided into four classes.

Drugs of Proven Value in a Variety of Conditions Often Encountered

The drugs in this group are of the more versatile class, valuable in general use in many conditions.

THE SULFONAMIDES

The discovery of the sulfonamides is one of the highlights of modern medicine. No other advance in medicine of the last two decades can approach it in significance.

The sulfonamides are offshoots of the azo dyes. Domagk, of Elberfeld, Germany, was the first to note the potency of prontosil, a red azo dye, in combating streptococcus septicemia in animals. He presented his findings

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in 1935. Colebrook, of England, is credited with the first clinical trials of the new synthetic. Colebrook used prontosil in the treatment of hemolytic streptococcal puerperal sepsis at Queen Charlotte's Hospital and reported its great clinical value. Certain French observers demonstrated that the active element of the dye was not a dye, but was a colorless chemical, para amino benzene sulfonamide, which we know as sulfanilamide. Gradually the knowledge of the specificity of this compound in action against certain types of micro-organisms was gained and the search for new compounds was rapidly carried on.

The second sulfonamide of clinical usefulness, sulfapyridine, appeared in 1938, and its specificity for pneumococcal infections was made known. In quick succession sulfathiazole, sulfaguanidine, sulfadiazine, and sulfasuccinyl were discovered and their particular clinical usefulness demonstrated. A great many other synthetic variations of sulfanilamide have been produced and tried out.

The mode of action of the sulfonamides is still in doubt. Many theories are extant on this subject. Suffice it to say that much knowledge has been accumulated concerning their toxicity, optimum dosage, specificity, and incompatibilities. The field is large and many chapters remain to be written on the subject.

Toxic Reactions to Sulfonamides. The number, variation, and severity of toxic reactions is sufficient to contraindicate their indiscriminate use. Two common practices in their use are to be particularly condemned: first, use as a panacea in ill-defined febrile conditions, "I did not know what it was—patient had a fever so I prescribed sulfa"; and second, the prescribing or dispensing of a several days' supply of the drug in cases where an examination of the patient for signs of development of toxic reactions cannot be made every second day.

The toxic reactions commonly encountered are listed in a table. In this table the reactions are classified according to degree of seriousness. Generally speaking, sulf-

anilamide is most toxic; then sulfapyridine, sulfathiazole, and sulfadiazine are relatively less toxic in the order named. Of the two at present used as intestinal antiseptics, sulfasuxidine is less toxic than sulfaguanadine, a lower percentage of the former being absorbed from the gastrointestinal tract.

Attempts at neutralizing or abating the toxicity of the sulfonamides by the concurrent administration of alkalis, vitamins, and other preparations have been met with indifferent success. It may be said that anything which will contribute to improvement of the patient's condition will certainly aid in combating toxic reactions. Here again good judgment in prescribing, and careful observation of the patient during a course of therapy with any of the sulfonamides must be urged.

Before leaving the subject of toxicities of these drugs, mention should be made of a precaution to be taken in their use in otitic infections. It has been repeatedly observed that there is a distinct tendency to masking of the degree and extent of involvement in ear infections. Following the use of sulfonamides there is rapid improvement in the patient's condition, subsiding of fever, lessening of drainage, and early rapid healing. At the same time, infection may spread to the mastoid cells, quietly, so to speak, and suddenly signs and symptoms of meningial infection or other complications of advanced mastoiditis appear. It is well to withdraw sulfonamide medication fairly early and allow opportunity for signs of extension of the infection to present themselves.

Uses of the Sulfonamides. Every doctor is familiar, for the most part, with the uses and specificities of the sulfonamides. Your attention is especially directed to the list of prophylactic uses.

Some comment is pertinent as to the use of sulfanilamide in the prophylaxis of rheumatic fever. Recurrences or recrudescences of rheumatic fever, especially in children, occur in from 10 to 15 per cent of cases. Several investigations of the value of sulfanilamide in prevention of recrudescences have been made and the results reported are encouraging. In one instance, a report based on a five year study, it was definitely shown that sulfanilamide does prevent recurrences. Sulfanilamide was administered in a dosage of one gram daily, over periods ranging from six months to five years, with no untoward effects traceable to the drug. In a control group receiving no sulfanilamide there was an incidence of 10 per cent recurrences, while in the sulfanilamide-treated group no recurrences were observed. In the main, the general health and vigor of the group receiving sulfanilamide was definitely improved. For prophylaxis, the drug is administered daily from October to June.

Modes of Use of the Sulfonamides. The sulfonamides lend themselves to three modes of use or administration: by mouth, parenterally, and locally.

By mouth, sulfanilamide, sulfapyridine, sulfathiazole, and sulfadiazine are rapidly absorbed, and are rapidly excreted via the kidneys. In order to be effective a fairly steady level of concentration in the blood stream and tissue fluids must be maintained. Sulfaguanadine, and sulfasuxidine are very poorly absorbed, and their use is

restricted to antibacterial activity in the lumen of the gastrointestinal tract.

Parenterally, sulfanilamide can be administered by hypodermoclysis, and the sodium salts of sulfapyridine, sulfathiazole, and sulfadiazine by intravenous or subcutaneous routes. When administered by hypodermoclysis, all must be given slowly and in low percentage solutions in order to prevent severe local tissue reactions.

Locally, the sulfonamides are being used in a great variety of ways: in powder form in wounds, surface infections, burns, etc., either alone, in combinations of one or more kinds of sulfonamides, or in combination with other drug powders. They are also being used in ointments, either alone or in combinations with other drugs in petrolatum or some water-soluble base. They are being used in jellies, solutions, wet dressings, and sprays. Zinc, codliver oil, allantoin, and various antiseptics have been used in combination with one or more of the sulfonamides. Improved results have been reported in the use of some type of oxidant in combination with the sulfonamides, particularly in conditions complicated by profuse purulent or seropurulent discharges.

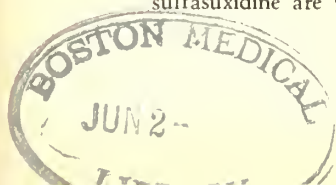
In the treatment of burns the sulfonamides are rapidly proving their worth, particularly sulfadiazine, used in the form of jellies or sprays, in combination with some tanning agent. The Pickrell method of treating burns gives excellent results. In Pickrell's method sulfadiazine $2\frac{1}{2}$ to 3 per cent in ethanolamines solution is used as a spray. Spraying is done on a definite time schedule. Infection is prevented or greatly modified, the patient is comfortable, and the eschar produced is thin and pliant. Toxicity is low, although caution must be exercised where more than 30 to 40 per cent of the total body area is involved.

Great promise is evident in further investigation of the sulfonamides and related compounds. It has been estimated that, to this date, over 5,000 of these compounds have been synthesized and tried out. Recently a new one, sulfamerazine, has been investigated and promises improvement over those now in use. Promin, another sulfone compound, has excited much hope that at last a chemical useful in combating tuberculosis has been found. It has been demonstrated to be of value in animal experimentation, and clinical trials are underway.

Finally, let us be reminded that the sulfonamides are not panaceas for all ills and that very definite indications must be present before their administration. Further we should keep in mind the fact that the members of this group show individual specificities for different types of pathogenic bacteria.

HUMAN BLOOD PLASMA AND SERUM

Quite an advance in the therapy of shock has been made in the development of methods of utilizing human blood plasma and serum. Certain conditions such as surgical shock, shock from extensive burns, and even shock from severe hemorrhage can be successfully and quickly combated by the intravenous administration of these preparations. Except in those chronic conditions where red cells are needed by the patient, plasma and serum are as effective as transfusions of whole blood.



Certain advantages in plasma and serum are: it is quickly available, may be stored for long or short periods, (depending upon type of processing), can be procured for use in localities where blood bank facilities are wanting, and typing is an unnecessary procedure in its administration.

In preparation the blood from eight or more people is pooled, corpuscles are removed, and the fluid is processed. It may be preserved in the following ways: (1) by ordinary refrigeration over a short period of time, (2) by quick freeze method, and (3) by desiccation under vacuum or lyophilization. In the latter method the water is removed and the plasma is reduced to a fluffy powder. Before administration it is restored to fluidity by the addition of sterile distilled water. The lyophilized plasma can be kept for longer periods of time and is easily transported.

Human plasma and serum were accepted by the Council on Pharmacy and Chemistry in 1941. Their earliest reported use was in 1907, and the earliest clinical reports were released in 1917.

One outstanding use of plasma and serum is in the treatment of the severe shock that quickly follows severe extensive burns. Recent investigation of the pathology in this condition has apparently refuted the idea that this shock results from the absorption of a toxin from the burned tissues. It has been shown that shock results from the hypoproteinemia developed by the very large loss of plasma proteins and electrolytes in the copious exudate from burned areas. Plasma and serum offer a rapid method of replacement of this loss.

Either plasma or serum is now on the market in two forms, the liquid which carries a dating of about one year, or the lyophilized form which has longer keeping qualities. It is rather expensive. Transfusion reactions have been reported from the use of serum, but they are fewer with plasma. It is advisable to use some type of filtering dripmeter in administering either preparation.

Other substitutes for whole blood transfusions have been used. Six per cent acacia solution has enjoyed considerable vogue and may be purchased in flasks ready for use. It is of some value in maintaining vascular fluids. Solutions of pectin, and special preparations of gelatin have been used. Amino acids in solution for parenteral administration offer much promise.

NEW EPINEPHRINE PREPARATIONS

Epinephrine 1:100 or 1 per cent aqueous solution, and 1:500 solution in oil are not especially new but deserve some mention here.

The 1 per cent aqueous solution is used by inhalation. A special atomizer or nebulizer is used to break up the liquid into extremely fine droplets, producing a mist which the patient inhales. It is quite useful in treating the milder forms of asthma. Side actions of epinephrine are not usually evidenced as there is very little absorption of the drug from the respiratory mucosa. Some dryness of the mouth and throat often results from continued use. An occasional patient is liable to overdo the thing.

The 1:500 in oil solution or suspension may be administered either intramuscularly or subcutaneously. It successfully prolongs the action of the drug by slowing up absorption. This is distinctly advantageous in overcoming the evanescent action encountered in the aqueous preparations.

DILANTIN IN EPILEPSY AND BRONCHIAL ASTHMA

Dilantin with its sodium salt was Council accepted in 1939. In the report from the Council on Pharmacy and Chemistry it was classed as the most effective of all known anticonvulsants.

It has a relatively weak hypnotic action, and few side effects. Occasionally encountered side actions are dizziness, dermatitis, gastrointestinal irritation, itching, and very infrequently, drug fever. It is seldom that these are encountered when the drug is administered within effective dose limits. It is more effective in grand mal than in petit mal epilepsy. One group of investigators found that dilantin and phenobarbital in combination were more effective in treating epilepsy than either one alone. This group placed the optimum dosage at 4 to 4½ grains daily.

Reports on the use of dilantin in asthma are encouraging. It has been reported to be of much value, particularly in children of "asthmatic personality" type. In these children the dosage is begun with ½ grain morning and night and cautiously increased by ½ grain daily. It is administered over long periods of time, and stopping the drug brings on a recurrence of the asthma. Improvement in personality and disposition in these children was noted. They were less irritable, and their school grades improved. There were no serious side effects encountered in the fairly large series reported.

NEW ANTISPASMODICS

Something over five hundred synthetic compounds have been investigated in recent years, in the attempt to find an antispasmodic as effective as atropine but without its disagreeable side actions. Several compounds are offered today. A few of them are novatropine, syntropan, trasentin, eupaverin, eumydrine and pavatrine.

They are effective in relaxing spasm of smooth muscle in such conditions as pyloric stenosis in infants, spastic dysmenorrhea, ureteral colic, and gastrointestinal spastic states. Extensive clinical trials of the use of one of them, syntropan, in obstetrics, have been made. Supposedly labor is shortened by the relaxing effect of this drug on the uterine cervix. Marked reduction in the length of labor in both primipara and multipara has been reported in a very large series of carefully studied cases. No deleterious side effects on the mother or infant were noticed, nor has postpartum hemorrhage been encountered in its use. It is given in a single dose of 100 mg. when the cervix is about 4 centimeters dilated. Further clinical trials may prove it to be of genuine worth.

In action these synthetics are musculotropic and not neurotropic, although one of them, pavatrine, does exert both types of action. A few of these compounds have some local anesthetic action, which accounts in part for

their beneficial effects on the pain in peptic ulcer with associated spasm.

NEW ADRENALIN-LIKE COMPOUNDS

This group of synthetics includes an old friend, ephedrine, and are adrenalin-like in action only. Included for discussion are paredrine and benzedrine. Unlike adrenalin they are effective by mouth as well as parenterally, and their action is more prolonged than that of adrenalin.

Paredrine, like ephedrine, has a marked action in increasing blood pressure. Paredrine exerts a longer action than ephedrine, its effect lasting for a period of from 60 to 90 minutes. Both of them are extremely valuable in combating the lowering of blood pressure often encountered in spinal anesthesia. Paredrine is also an efficient mydriatic, acting in about 45 minutes and lasting about two hours. It does not increase intraocular tension.

Benzedrine is noted for its stimulative effect on the central nervous system and has been found valuable in the treatment of postencephalitic parkinsonism. Its use has been abused by the lay public as an antidote for fatigue and as a substitute for much needed sleep. The long list of conditions in which its use has been reported includes chronic exhaustion, asthenic-states, mental depression, obesity, alcoholism, barbiturate narcosis, seasickness, enuresis, and dysmenorrhea.

VITAMINS

Vitamins have become big business because of the public's huge consumption of them for the treatment and prevention of every ailment under the sun. The use in medical practice of large doses of the vitamins, particularly the B vitamins, in the absence of definite signs of avitaminosis is to be condemned.

Among the most recent advances in knowledge of the vitamins are the advent of vitamin K and the individual B factors.

Vitamin K is essential to health in maintaining normal prothrombin level. It is found deficient in biliary tract disease with jaundice, and in hemorrhagic diathesis in the newborn. It is now available in synthetic form effective by mouth or parenterally. When given orally in jaundice it is rendered more effective by the concurrent administration of bile salts. One to two mg. administered intravenously to the mother at the onset of labor is usually sufficient to prevent hemorrhage in the newborn. It may be administered to the baby by vein or subcutaneously.

Of the B factors the following are of chief interest: thiamin, nicotinic acid, riboflavin, pyridoxine and pantothenic acid. Thiamin deficiency is characterized by anorexia, retarded growth, and peripheral neuritis. Nicotinic acid deficiency results in pellagra. Riboflavin deficiency is characterized by lesions of the lips, cheilosis, glossitis, and vascular changes in the sclera and cornea. Pyridoxine deficiency is characterized by muscular weakness. Pantothenic acid has enjoyed some repute as being the gray hair factor, but is still somewhat of a laboratory curiosity. Frank deficiencies of any of these factors warrant their prescription; however the average patient in this region ingests sufficient amounts of all of them in a well balanced diet.

Recent work on the B vitamins has shown at least fourteen different elements of factors in this group. The most recent one, Bc, is, apparently, an antianemic factor and is closely related to folic acid. Lowered blood levels of either Bc or folic acid is suspected as the cause of leukopenia and anemia developing in patients who have received long courses of the sulfonamide drugs.

Drugs of Value in Specific Use

The drugs placed in this group may be of usefulness in several conditions other than those discussed.

ADRENAL CORTICAL EXTRACTS AND THE SYNTHETIC CORTICAL STEROIDS IN ADDISON'S DISEASE

Twenty-four different steroids have been isolated from the adrenal cortex, six of which have been shown to possess physiologic activity. One of them, desoxycorticosterone, has been produced synthetically. This synthetic hormone is effective in the treatment of Addison's disease, particularly in maintaining the level of sodium in the body fluids. Its action on carbohydrate metabolism is not so marked as that of the natural occurring cortical extracts. Instances in which this synthetic alone was not entirely effective have been reported.

AMINOPHYLLINE INTRAVENOUSLY IN THE TREATMENT OF BRONCHIAL ASTHMA

Aminophylline, theophylline ethylene diamine, is of great value in the treatment of attacks of bronchial asthma. Administered intravenously in doses of $\frac{1}{4}$ to $\frac{1}{2}$ gram in 200 to 1,000 cc. of 5 or 10 per cent glucose solution it is very effective in abating the attacks. It has been stated by some clinicians that it is of definitely greater benefit than epinephrine, and the Council on Pharmacy and Chemistry comments favorably in a report issued recently. It acts directly on the bronchial musculature which it dilates. Its action is more certain and of longer duration than epinephrine. It may be repeated at eight-hour intervals for three or four doses. Occasional side effects such as nausea and vomiting may occur, but do not preclude a repetition of the drug. Its effectiveness may be somewhat enhanced if the patient is kept drowsy for the first twenty-four to thirty-six hours, and paraldehyde by rectum has been advocated for this. Aminophylline by vein is of particular benefit in the asthmatic who has become unresponsive to epinephrine.

Theamin or theophylline mono ethanalamine is of value in asthma also. Administered orally in doses of 2 to 4 grains at the onset of the attack, it is beneficial. It is also useful in urticaria and angioneurotic edema.

Certainly these two drugs should be kept in mind for use in treating bronchial asthma.

ATABRINE IN THE TREATMENT OF GIARDIAL INFESTATION

Atabrine, developed primarily for the treatment of malaria, has found another use. It is specific in its action on intestinal flagellates Giardia.

Giardial infestation of the human intestinal tract has long been known and is very commonly encountered in all climes. It was formerly thought that the giardial

flagellates were nonpathogenic for the human host but recent investigation has shown that they will cause a chronic diarrhea. Symptoms usually consist of a diarrhea with from two to twenty watery stools daily, and some abdominal distress. The flagellate most usually found is *Giardia lamblia*, dwelling in the upper portion of the small intestine. Ulceration of the intestinal mucosa is not usually encountered. Atabrine, administered in a course of three tablets daily for five days will clear up most cases. Only occasionally is it necessary to repeat the course.

DIHYDROTACHYSTEROL (A.T.10) IN PARATHYROID DEFICIENCY

Dihydrotachysterol, an activated complex sterol, is practically specific in maintaining normal blood levels of calcium in parathyroid deficiency states. It is very superior to any form of vitamin D. It is of no value in tetany or rickets. Its toxicity is low, though there is danger of producing hypercalcemia and the dosage must be regulated by frequent blood calcium determinations. It also seems to possess some action on the calcium-phosphorus ratio. It is administered in doses of from 2 to 5 mc. daily and is quite expensive.

QUININE IN MYOTONIAL DISORDERS

Myotonia congenita and myotonia atrophica, and other myotonic disorders are rare conditions not often met with in the usual run of practice. Quinine is of great value in controlling the myotonic spasms that characterize these diseases. Quinine is not curative; the symptoms return on withdrawal of the drug. It is believed to exert a curare-like action in which it decreases the excitability of the endplates of motor neurones. In many cases the myotonic symptoms have been reported to be entirely relieved.

Promising Drugs Now Undergoing Further Clinical Investigation

A few of the therapies in this category are startling in their offer of promise. Some of them must undergo much more investigation before they can become generally useful.

AMINO ACIDS AND PLASMA PROTEIN PRECURSORS FOR INTRAVENOUS ADMINISTRATION

Solutions of glucose and electrolytes by parenteral routes, particularly by venoclysis, have been in use for a considerable period of time, and their worth is great. The next logical step in supportive treatment along this line is the use of proteins, or their precursors, parenterally. This now appears to be a definite possibility.

A considerable amount of animal experimentation on the use of amino acids parenterally has been done, and the feasibility of the procedure has been thoroughly demonstrated. In a protein-fasting dog, receiving sugar, fats, and mineral requirements by mouth, the administration of normal dog plasma by vein has maintained proper protein balance, and good health for many weeks. Amino acids in the form of casein digests have been used in place of the plasma and found to be nearly as effective.

This procedure in man has been used in enough instances, clinically, to prove its effectiveness and worth.

A large number of excellent reports can be found in the literature, and the procedure holds great promise. In the patient who cannot take food by mouth over varying periods of time casein digests solutions, parenterally administered, will supply sufficient plasma protein precursors to maintain a good protein balance. When used over long periods of time occasional administration of plasma or serum is necessary.

Studies on shock have shown that hypoproteinemia is, in a large measure, the condition that causes a fatal outcome. Correction of this hypoproteinemia can be accomplished quickly by the administration of plasma or serum. In the more serious cases one or two units of plasma will not suffice, and large amounts, as much as 2,000 to 4,000 cc. is required in a relatively short period of time. To secure this much plasma would require a great many donors. Casein digests used as supplements to plasma are very efficient in supplying the protein needs in such cases.

An enzymatic hydrolysate of casein has usually been the preparation used. This material is on the market, called amigen, and comes in dry form. It is made up in 2½ to 5 per cent solutions and the pH of the solution is adjusted to 6.5. The solution must be made up with pyrogen-free distilled water, and may be sterilized by either autoclaving at low pressures or by Seitz filtration. It is administered by vein, 300 to 500 cc. per hour. Very rarely are allergic reactions encountered, and occasionally mild phlebitis in the vein used. None of the reactions encountered has been of serious nature. There is a very insignificant loss of the amino acids via the kidneys and apparently most of the material is absorbed and utilized by the tissues.

A great deal of experimental and clinical investigation of this procedure is going forward at present, and reports are uniformly good. In addition to amigen there is another preparation of amino acids now offered in 15 per cent solution, 100 cc. to the vial. You will find an enlightening report on this subject in the Dec. 12 (1942) issue of the *Journal of the American Medical Association*.

THE ANTICOAGULANTS

Useful, particularly in blood vessel surgery, embolic diseases and in prophylaxis of thrombosis and embolism, heparin and dicoumarin are the two drugs in use today.

Heparin has been standardized as to its anticoagulant properties, and is active only when administered by vein. Dicoumarin is effective by mouth and cannot be used by vein. Heparin has the higher margin of safety and definiteness of action. Its action can be stopped at once by injection of protamine salmine sulfuric acid. Dicoumarin is rather unpredictable in its action. It lowers prothrombin levels and occasionally its effects have lasted for a considerable period of time after withdrawing the drug.

Both of these offer promise of value in the following conditions: massive pulmonary embolism, blood vessel surgery, prophylaxis of postoperative thrombosis and embolism, cavernous sinus thrombosis and subacute bacterial endocarditis.

USES OF THE SULFONAMIDES
Oral or Parenteral Administration

CONDITION	DRUG OF CHOICE
Infections Due to Hemolytic Streptococci* Bacteremia Cellulitis Erysipelas Meningitis Osteomyelitis, and Suppurative Arthritis Otitis Media Peritonitis Pneumonia, and Empyema Puerperal Sepsis	Sulfadiazine in all.
*In infections due to Alpha Hemolytic Streptococci Sulfapyridine and Sulfathiazole seem better than Sulfadiazine.	
Infections Due to Pneumococci Bacteremia Meningitis Otitis Media, and Mastoiditis Peritonitis Pneumonia	Sulfadiazine in all.
Infections Due to Staphylococci Abscesses, Carbuncles Bacteremia Meningitis Osteomyelitis, and suppurative Arthritis Pneumonia	Sulfadiazine in all.
Infections Due to Gonococci Arthritis Genital Gonorrhoea Ophthalmia Neonatorum	Sulfapyridine Sulfathiazole Sulfathiazole
Infections Due to Meningococci Bacteremia Meningitis	Sulfadiazine in all.
Urinary Tract Infections For most organisms B. Coli infections	Sulfathiazole Sulfacetimide

Miscellaneous Conditions

Actinomycosis
 Chancroid

 Gas Gangrene
 Dysenteries, and acute enteritis
 Influenza Bacillus Infections (Especially Meningitic)

 Skin Infections - Impetigo, etc.
 Trachoma
 Undulant Fever Acute
 Undulant Fever Chronic*

Sulfanilamide*
 Sulfanilamide or
 Sulfathiazole
 Sulfathiazole
 Sulfasuxidine
 Sulfanilamide and
 Sulfapyridine*
 Sulfathiazole
 Sulfanilamide
 Sulfanilamide
 ?

*Many controversial reports as to efficacy.

Prophylaxis

Gonorrhea - following exposure
 Measles prevention of complications
 Rheumatic Fever - prevention of recrudescences
 Scarlet Fever - prevention of complications
 Septic Sore Throat - following exposure
 Whooping Cough - prevention of complications
 Wounds - prevention of infection
 Surgery of gastro-intestinal tract

Sulfathiazole
 Sulfadiazine
 Sulfanilamide
 Sulfadiazine
 Sulfadiazine
 Sulfadiazine
 Sulfadiazine
 Sulfanilamide
 Sulfasuxidine

LOCAL USE

Burns

 Skin infections - impetigo, etc.

 Surgery - wounds, etc.
 Chronic infected ulcers

Sulfadiazine in jellies,
 pastes or ointments or
 solutions.
 Sulfathiazole in oint-
 ments or powder.
 Sulfanilamide
 Sulfanilamide or
 Sulfathiazole.

Conditions in which Sulfonamides are of doubtful value

Tularemia
 Plague
 Malaria
 Subacute Bacterial Endocarditis

Conditions in which Sulfonamides have not been proven to have any value

Chorea	Anthrax	Mumps	Rocky Mtn. Spotted Fever
Smallpox	Diphtheria	Influenza	Rheumatic Fever
Measles	Rabies	Syphilis	Chickenpox
			Poliomyelitis

BENZEDRINE IN EPILEPSY AND PARKINSONISM

Benzedrine, one of the synthetic antispasmodics, exerts a powerful stimulative action on the central nervous system.

Its value in epilepsy lies in its ability to combat or neutralize the narcotizing effects of the large doses of barbiturates used in treatment. Administered with large doses of phenobarbital, benzedrine prevents the development of dizziness, ataxia and drowsiness so commonly encountered.

In parkinsonism it is especially helpful in decreasing the number and severity of oculogyric crises. It also gives subjective improvement in muscle strength and allows a better sleep cycle. Its effect is greater in postencephalitic than in arteriosclerotic parkinsonism. It has none of the disagreeable side actions of the atropine group, and tolerance development is not encountered.

Benzedrine has been accepted by the Council on Pharmacy and Chemistry for the treatment of narcolepsy, postencephalitic parkinsonism, certain psychic fatigue states, and as an adjunct in facilitating x-ray studies of the gastrointestinal tract. The Council does not recommend it for anything else.

KIDNEY EXTRACTS IN THE TREATMENT OF HYPERTENSION

This therapy is still in an early experimental stage. It has been shown, in animal experimentation, that an ischemic kidney releases some pressor substance that causes a sustained rise in blood pressure, and that the hypertension so produced can be overcome by the administration of extracts of fresh kidney. The exact nature of the pressor, and antipressor substances has not been demonstrated. Extracts of kidney substance have been used in human subjects in the treatment of essential hypertension with some success. Serious untoward reactions have occurred in the course of treatment. Though this seems to be of considerable promise, a great deal of investigative work needs to be done before it becomes a generally accepted therapy.

MORPHINE SUBSTITUTES

For the past fourteen years an extensive research program has been in progress to study morphine, its derivatives and substitutes. Several very promising substitutes for morphine have been found. Two of these, metopon and demerol, have been extensively studied clinically and found to be of value.

Metopon is a methyl derivative of dilaudid, possesses greater analgesic action than morphine, and has less tendency to addiction.

Demerol is a synthetic, atropine-like in structure, and ranks between codeine and morphine as an analgesic. It possesses some spasmolytic action, and is very fine for relief of colicky pain. Very little tolerance is developed; though there is some addiction tendency it is less than morphine. Side effects are not marked nor extremely unpleasant. A feeling of fullness in the head and dizziness is occasionally encountered which calls for caution in using it in an ambulatory patient. Demerol, effective both orally and parenterally, is given in doses ranging from 50 to 200 mg. Its effect appears in from 15 to 45

minutes and lasts from one to three hours, depending on the size of the dose. Urinary retention and respiratory depression rarely occur. An excellent report on demerol was published in the May 22 (1943) issue of the *Journal of the American Medical Association*.

ORGANIC MERCURIAL DIURETICS FOR ADMINISTRATION BY MOUTH

The percentage of effectiveness of the organic mercurial diuretics, according to route of administration, is as follows: by vein 90 to 100 per cent; by mouth 65 to 75 per cent; and by rectum 40 to 60 per cent. The same precautions against danger of kidney damage must be taken whether these drugs are given by mouth or vein. When given by mouth gastrointestinal irritation is a common side action. In the ambulatory patient with less edema this is more often encountered. One of these preparations for oral administration has been accepted by the Council on Pharmacy and Chemistry.

PENICILLIN AND GRAMICIDIN

Discovered in 1929, penicillin is produced in minute amounts by the mold *Penicillium notatum*. The first clinical reports on its antibacterial activity were made in 1940 by British investigators. A fairly large amount of evidence of its worth is accumulating, and all of the reports are extremely encouraging.

Penicillin has bacteriostatic and bactericidal action on the following organisms: certain strains of hemolytic streptococci, *staphylococcus aureus*, *diplococcus pneumoniae*, the Neisserian organisms, gas gangrene organisms, *actinomyces bovis* and other gram-positive organisms. It appears to be ineffective against most gram-positive organisms. This effect is produced both in vitro and in vivo and is stronger than that of the sulfonamides.

Penicillin is effective both by oral or parenteral administration. Administered by vein it is best given in normal saline or 5 per cent glucose solution as a slow continuous drip. Oral administration is uncertain unless given by duodenal tube as the drug is inactivated by acid media. There have been no harmful side effects noted in its use. It is rapidly eliminated by the kidneys, and soon disappears from the blood after stopping the drug. When used locally in wounds or cavities its activity is not hindered by the presence of pus, blood or serous exudates.

It is the consensus of most investigators that penicillin is more effective than the sulfonamides, but its use should be restricted to those infections with bacteria against which it is definitely known to be active. It is not a panacea nor a "shotgun" remedy. Its action is often very dramatic. One instance is reported of its use in the treatment of three cases of sulfonamide-resistant gonorrhoea. In all three cases negative cultures were obtained within forty-eight hours after penicillin treatment was begun.

At the present time sixteen American companies are engaged in or have signified their intention to engage in the manufacture of penicillin on a large scale. Present production facilities are giving only a meager amount of this drug, and there are a great many technical difficulties to overcome before very much of this substance is

available for general use. Extensive clinical tests are being carried out at Bushnell General Hospital, Brigham City, Utah. So far, more than 300 patients have been or are being treated there with excellent results. In that series of cases penicillin has achieved results where the sulfonamides have failed, especially in infections with hemolytic streptococci, pneumococcus and gonococcus. Certainly this substance has tremendous possibilities.

News of another substance, penatin, produced by the penicillium mold, with greater possibilities than penicillin, has been announced in a recent issue of a popular weekly news magazine. No clinical reports have been seen by this author.

Gramicidin is a by-product of tyrothricin obtained from soil bacteria. Dr. Rene Dubos of the Rockefeller Institute for Medical Research discovered it in 1939. Unlike penicillin, it is very toxic when injected intravenously and is insoluble in water. It is not absorbed by the tissues when applied locally. Its bacteriostatic properties are specific for about the same organisms as penicillin with a few minor exceptions. It is not effective against gram-negative organisms. Gramicidin has been investigated clinically and has been used in local applications to infected wounds, chronic infected ulcers and cavities, osteomyelitis, etc. Its action is not hindered by the presence of pus, blood or exudates. Caution must be taken in its use that none of the substance gains access to the circulatory system. It may be used in powder form or suspended in water or oil. Gramicidin is a valuable addition to the list of useful antibacterial agents, but it is not as versatile as penicillin.

PICROTOXIN IN BARBITURATE POISONING

Picrotoxin is a powerful central nervous system stimulant which seems to be much more effective in the treatment of barbiturate poisoning than any other known analeptic agent. In one report on this subject results of treatment in twenty cases is given. Fifteen of these patients recovered and five died. It was the conclusion of the investigator in this series that ordinary stimulants are useless in severe barbiturate poisoning, and that picrotoxin is effective with no ill effects following its use. Other measures, such as prompt lavage of the stomach and intravenous administration of glucose should not be neglected. Picrotoxin should be administered in sufficient dosage, and frequently enough to keep the patient in a restless condition. Allowing the patient to lapse into a deep coma for a period of hours greatly lessens the chances of recovery.

The Council on Pharmacy and Chemistry has issued a report on this subject. They report that picrotoxin would appear to be of value in the treatment of barbiturate poisoning. Dosages effective are reported as being from 1 to 10 mg., either intravenously or intramuscularly, at intervals of from one to thirty minutes until signs of stimulation occur. A state of slight restlessness should then be maintained by further doses as indicated by the patient's condition.

PROGESTERONE

Progesterone is the corpus luteum hormone. Its presence in the blood stream causes the building up of pre-

gravid or premenstrual type uterine mucosa. Experiments have shown that removal of the corpus luteum during early pregnancy causes a destruction of the pregnancy and abortion. Experiments have also shown that progesterone diminishes or abolishes contractions of the uterine musculature.

The clinical uses of progesterone that have been suggested are: treatment of recurrent or threatened abortion where the cause is believed due to corpus luteum deficiency, dysmenorrhea, after-pains and functional uterine bleeding. In the treatment of abortion it may be helpful in those cases not caused by abnormalities of the fetus. Results in dysmenorrhea are rather indifferent but it is of some benefit in the spastic type. Prompt relief from after-pains usually follows its administration, and no serious hemorrhage has been encountered in its use. In functional uterine bleeding it is of some benefit, but organic disease should be first ruled out.

Progesterone has considerable promise, but a greater and more precise knowledge of its physiology is needed.

RADIOACTIVE PHOSPHORUS IN TREATMENT OF THE LEUKEMIAS

Treatment of the leukemias by x-ray, using spray or whole body irradiation, has been useful but is limited as to amount of dosage given. Radioactive phosphorus, called P-32, is a product of the cyclotron or atom-smashing machine. The preparation contains about one radioactive atom in every million. P-32 loses its radioactivity on the basis of a half-life in something over 14 days. In three weeks from the time of administration very little activity remains. Animal experimentation has shown that P-32 concentrates first in the bone marrow, and later in the osseous tissues. This provides a type of x-radiation that very specifically reaches the tissues where needed.

The dosage of P-32 is regulated according to the patient's clinical status, and to body weight. It is measured in micro- and millicuries and the usual dose is from 70 to 100 microcuries per kg. of body weight. The total dose is divided into five to seven fractions, and one fraction given daily over a period of five to seven days.

The results have been encouraging, though the treatment is to be regarded as palliative and not curative. Definite regression of the leukemia has resulted in many cases treated. The white count decreases, hemoglobin and red cells increase, and the patient's general condition improves. It appears to be more effective in the chronic than in the acute leukemias.

SOBISMINOL IN THE TREATMENT OF SYPHILIS

Sobisminol is included in this discussion by reason of its being an effective antiluetic bismuth preparation for oral administration. It is a semisolid complex organic compound containing bismuth, and may be administered by mouth or intramuscularly. Gastritis with nausea and vomiting, stomatitis, and dermatitis is occasionally encountered. In the average patient it is fairly well tolerated by mouth. By mouth it maintains an effective level of bismuth in the blood and tissues. Sobisminol for oral or intramuscular administration has been Council accepted.

STILBESTROL

In stilbestrol we have a synthetic preparation with estrogenic activity which is effective by mouth. Indications for its use are practically the same as those for the naturally occurring estrogens. Not the least of its advantages is its very low cost.

Animal experimentation has shown stilbestrol to be somewhat toxic, with hepatic damage as the most outstanding reaction. In the human female some of the untoward changes that will occur are proliferation of endometrium with bleeding, painful enlargement of the breasts, occasionally delayed menses and increased sexual stimulation. A common reaction is nausea and vomiting which can be overcome to some extent by the use of smaller doses and administering it in gelatin capsules. It should not be administered over long continued periods of time, but should be given in courses with rest periods.

The only real indication for its use, as borne out by clinical trials in many disorders, is in the treatment of the disagreeable symptoms of the menopause. In this it is effective, but careful regulation of dosage is needed. In the treatment of prostatic carcinoma with stilbestrol there have been controversial reports, and much further clinical investigation is needed before its use can be advocated. It has been suspected of being carcinogenic, but to date no adequate proof of this is known.

Caution should be exercised in the use of stilbestrol, beginning with the smaller doses and gradually increasing the dosage until the therapeutic effect is reached.

Drugs of Doubtful Value

A few of the drugs placed in this category are definitely useful in some conditions, but clinical evidence of their value in certain other conditions is definitely lacking.

ADRENAL CORTICAL HORMONES AND SYNTHETIC STEROIDS IN THE PREVENTION AND TREATMENT OF SHOCK AND IN ASTHENIC STATES

A considerable amount of literature on this subject has accumulated with very little real conclusive evidence presented. The underlying cause of shock in conditions other than severe hemorrhage is still a matter of conjecture, with no conclusive evidence to uphold any one particular theory. The rationale offered for the use of adrenal cortical extract in shock is based on the ability of this hormone in decreasing the permeability of capillaries. Supposedly some sort of toxins are produced by burned or damaged tissues which greatly increase capillary permeability. In certain instances it has been shown that plasma transfusion in a dog with adrenal insufficiency causes edema and collapse which can be prevented by the administration of adrenal hormone. Here the presence of adrenal insufficiency leaves this experiment with no conclusive evidence that the adrenal cortical hormone would be of value in the human with normal adrenal cortex. One study on hypoproteinemia in shock, mentioned earlier in this paper, seems to be very significant and a good beginning for new conceptions of shock. The benefit derived from plasma and serum administered in shock without the concurrent administration of cortical hormone is sig-

nificant. Doubtless, further investigation of this hormone should be carried out, but in the light of present knowledge its value in shock is questionable.

Adrenal cortical hormones have been suggested for combating muscular weakness and lack of tone associated with asthenic and fatigue states. Animal experimentation has shown that continued administration of this hormone, in the absence of demonstrable adrenal insufficiency, may cause atrophy of the adrenal glands. This is a definite contraindication for their indiscriminate or careless use.

To date, the only real indication for the administration of these hormones is the presence of demonstrable adrenal cortex insufficiency.

BULGARIAN BELLADONNA IN PARKINSONISM

Extracts of Bulgarian belladonna root have been offered as being superior to all other preparations of belladonna and its alkaloids in the treatment of Parkinson's disease. It has been put to the test of comparison with the other preparations in several carefully planned and studied series of cases. No foundation for claims of superiority have been found. Our own home-grown U.S.P. belladonna root is equal to it in effectiveness. These studies did reveal that the white wine extracts of belladonna root, either home-grown or Bulgarian, were a bit more effective than other preparations of these alkaloids.

COBRA VENOM FOR RELIEF OF PAIN

Some rather startling claims as to the efficacy of cobra venom in relieving pain in chronic conditions have been made. Definite basis for its physiological action has not been substantiated. One investigation of its use in relief of pain in rheumatoid arthritis was reported. Twelve cases were studied. The venom was given in larger doses than ordinarily suggested. No toxic effects were encountered with the exception of a local reaction at the site of injection in one patient. Nine of the patients experienced no relief whatsoever, three of the patients experienced subjective relief rated at from 25 to 75 per cent. The conclusions of this study were that cobra venom is of no value in the relief of pain in rheumatoid arthritis.

The author of this paper has used it for relief of pain in two cases of inoperable carcinoma, and one case of Parkinson's disease having severe muscle and joint pains. No relief of pain was observed in these cases.

HISTAMINE AND HISTAMINASE IN THE TREATMENT OF ALLERGY

Reports on this subject are highly controversial. Results in animal experimentation would seem to be very promising, but clinical trials are usually disappointing. Occasional reports of remarkable success can be found. The psychological effect on the patient of a promising new treatment might be suspected as having a large part in some of the good results reported. The physiologic action of histamine and histaminase is too little understood to make any definite conclusions. Suffice it to say that their value in the treatment of allergy is very doubtful.

POTASSIUM SALTS IN ALLERGIC DISEASES

Investigation of the claims for the effectiveness of potassium salts in allergic diseases follows along the same

general lines as holds true for histamine and histaminase. It seems rather futile to expect therapeutic effect from the administration of potassium in smaller amounts than the total daily intake of this cation contained in the food ingested by the patient.

PYRIDOXINE (Vitamin B₆) IN PARKINSONISM AND MUSCULAR DYSTROPHIES

Pyridoxine is still somewhat of a mystery. That it is essential to health is an accepted fact, but its role in nutrition and metabolism is not fully known. One of the results of deficiency of this vitamin is muscular weakness and incoordination, and this, fact, probably, led to its trial in the treatment of parkinsonism and muscular dystrophies. Reports on the subject are meager, and not very encouraging. There have been a few favorable reports based on rather slight evidence. Until much more is known concerning this vitamin its use cannot be endorsed for anything other than the correction of demonstrable deficiency disease.

TESTOSTERONE IN MALE CLIMACTERIC, PROSTATIC HYPERTROPHY AND GYNECOLOGICAL DISORDERS

The only clear-cut indication for the use of the androgenic hormone is in the treatment of prepuberal and postpuberal castrates, and hypogonadism, as a replacement therapy. It is not as effective as chorionic gonadotropin in the treatment of cryptorchidism. Testosterone provides substitution, and chorionic gonadotropin stimulative therapy. In a major portion of the reports and literature on the use of testosterone in male climacteric, prostatic hypertrophy, and gynecological disorders, the conclusions are based on poorly controlled clinical trials, and scant consideration is given to all the factors which might influence results.

There is no real evidence that a climacteric, comparable to the menopause, occurs in males. One is inclined to suspect that many of the benefits reported from the use of testosterone in aging men is the result of psychic factors. Testosterone has not been proven capable of reducing the size of the hypertrophied prostate. Improvement of nocturia, dribbling, etc., has been reported, but this may well be due to generalized improvement in muscle tone.

In gynecological practice testosterone has been used in the treatment of functional bleeding, dysmenorrhea, premenstrual mastalgia, and the menopausal syndrome. One factor is fairly common to all instances where this therapy has been effective: large doses have been used to secure the desired effect. In the female a very common result of testosterone administration is the development of masculinism with hirsutism, hoarseness of voice, acne and clitoral enlargement. Usually this is a temporary result but it often remains permanently, long after the drug has been discontinued. The larger the dose, the more danger of this disadvantage appearing, and it certainly is an unfortunate result. This disadvantage should be carefully considered in weighing the usefulness of this therapy in females.

Toxic Reactions to Sulfonamides Most Frequently Encountered

<i>Not Serious; Drug may be continued under close observation of patient.</i>	<i>Moderately Serious; Indication for stopping drug.</i>	<i>Serious; Stop drug and institute supportive treatment.</i>
Cyanosis	Nausea and Vomiting (Severe)	Drug Fever
Headache and dizziness	Leukopenia	Dermatitis
Moderate Anemia	Hematuria	Hepatic damage
Psychic Disturbances (Mild)	Severe Psychic Disturbances	Acute hemolytic anemia
		Agranulocytosis

Until the exact nature of the action of this endocrine has been carefully and fully delineated, its use should be restricted to the treatment of testicular deficiency in the male.

VITAMIN E (Tocopherols), IN THE TREATMENT OF MUSCULAR DYSTROPHIES

Animals fed on diets deficient in vitamin E develop degenerative changes in the central nervous system, particularly in the motor neurons, resulting in muscular atrophy. This fact has, no doubt, suggested the use of tocopherols in the treatment of muscular dystrophies and amyotrophic lateral sclerosis. Some very glowing reports on this subject have been issued, none of which has been borne out in carefully controlled clinical trials. Recent reports have been quite uniform in concluding that vitamin E is of no benefit in these diseases.

Vitamin E has been recommended for the prevention of abortion, and in the therapy of habitual abortion. The Council on Pharmacy and Chemistry has issued a report dealing with this subject. The Council concludes that claims of this vitamin being of value in the treatment of habitual abortion, menstrual disorders, menopausal pruritis, and failure of lactation cannot be supported.

IN CONCLUSION

A few new drugs and some new uses for older familiar drugs have been discussed. Mention should be made of other recent therapies of promise. Our armed forces are using tetanus toxoid, and yellow fever and typhus vaccine. In pediatrics the worth of pertussis vaccine has been well established. Benzyl benzoate, and rotenone are being endorsed for the treatment of scabies, and phenothiazine as an anthelmintic. Strange to relate, caudal anesthesia in obstetrics has made its debut without the usual newspaper and magazine furor that often precedes general acceptance of a new therapy by the medical profession.

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News-Letter

of the American Student Health Association

Interest in a spring meeting of the Association seems to be increasing, according to replies to a letter sent to Council members. Obstacles include the strain on transportation, overloading of depreciated staffs, and inability to decide, with the present scrambled schedules, upon a date when the largest attendance may be expected. Recognizing all of these difficulties, the Executive Committee will make a final decision within a short time and members will be notified by letter of the plans. The Committee welcomes aid in making its decision.

A recent communication from the American Public Health Association calls attention to a report from their Committee on Professional Education on Educational Qualifications of Health Educators. The report is detailed and inclusive, outlining the general scope of health education, the functions of health educators, and the place for graduate training. Copies of the report may be obtained from the American Public Health Association upon request.

Inquiries reach the Secretary for specific information on sick call rates and costs for specialized training groups. By this date, many schools will be in a position to answer these questions. For some time the following report from the University of Michigan has been waiting publication:

The Health Service conducts sick call for the Army and sees Navy patients as referred from the Navy sick call conducted by Navy Medical personnel. The Health Service makes no official records or reports, and does neither physical examinations nor immunizations for the Army or Navy. Contract figures were set at \$2.75 per month per man for the Army and \$2.85 for the Navy. For July, a favorable month, this report is made:

JULY 1943 ONLY

A. Clinic Records

	Civilian	Army	Navy
Enrollment	4,610	1,145*	1,390
Clinic Calls	7,799	704	422
Sick Calls		802	778†
Hospitalized Patients	97	17	27
Room Calls	54	12	19
Dental Patients treated	75	79	20

*Under Health Service Contract.

†Held by Naval Medical Officers in personnel quarters.

B. Costs

	Per Man Month
Civilian student net	\$2.40
Army additional \$.49*	2.80
Navy additional \$.35*	2.75

*Services for which civilians pay.

PERSONAL ITEMS

Dr. Helen B. Todd, formerly of Bowling Green College, Bowling Green, Ohio, has joined the staff of the Division of Health Education, according to a recent letter from Dr. Florence Mahoney, director of that Division of Stephens College, Columbia, Missouri.

Dr. R. W. Bradshaw reports that his assistant, Dr. J. Oscar Thomson, long a surgeon and teacher in China,

is leaving Oberlin to accept the position of Medical Director for the Fisher Body Tank Plant at Flint, Michigan. Dr. Thomson's place will be taken by Dr. W. H. Turner, of Round Hill, Virginia.

Dr. Gail McClure, physician on the staff of the Health Service at Iowa State College, was married December 3, 1943, at Ames, Iowa, to Chief Pharmacist's Mate A. C. Proffitt.

Dr. F. T. Gastineau has been appointed Acting Director of the Student Health Service at the University of Oklahoma, succeeding Dr. W. A. Fowler, who has gone to the University of Arkansas. Other members of the Oklahoma Student Health Service staff are Dr. Eleonora Schmidt and Dr. W. H. Atkins.

Dr. Stefanie Young, formerly of Hartford, Connecticut, has been appointed College Physician at Eastern Kentucky State Teachers College, Richmond, Kentucky, succeeding Dr. Henry C. Jasper, who had been Acting College Physician since the resignation of Dr. Jacob D. Farris.

DIGEST OF MEDICAL NEWS

Bacteriostatic Action of Euflavine and Proflavine Dressings. The belief has frequently been expressed that adsorption of such antiseptic dyes as Euflavine and Proflavine by the cellulose of the gauze used in making impregnated dressings is a serious disadvantage. Using *Cl. tetani*, *Cl. welchi*, *Cl. oedematiens*, *Vibriion septique* and *Str. pyogenes*, Savage (*Phar. J.* Aug. 7, 1943) conducted experiments to determine the effects of immersing impregnated gauze in infected blood and incubating for varying periods of time. The organisms were then counted and the results compared with those obtained from plain gauze controls. The results showed:

- (1) The euflavine gauze was slightly superior to the proflavine gauze.
- (2) *Cl. tetani* and *Str. pyogenes* were best controlled, the poorest control was exerted on the *Vibriion septique*.
- (3) Adsorption of the antiseptic dyes by the cellulose of impregnated gauze is a possibility in extemporaneously prepared dressings but is not a serious danger in impregnated dressings with fixed ratios of cotton to antiseptic.

Warning Against Use of Sodium Sulfathiazole in the Nose. In the *American Journal of the Medical Sciences* of October, 1943, Fabricant issues the warning that sodium sulfathiazole in the nose may destroy cilia, derange the physiologic nasal pH, injure the mucous membrane and (judging from the effect in laboratory animals), produce bronchopneumonia. The author points out, however, that some of the sulfonamides may be employed in the nose and sinuses successfully in a limited number of directions.

Sodium Fluoride for Control of Ants. Bibby and Secrest (*J. Economic Entomology*, August, 1943) report very favorably on their use of sodium fluoride as a control measure against ants at a U. S. Naval Hospital. They report:

- (1) "It did all that was promised in Leaflet No. 147

of the U. S. Department of Agriculture and many times more."

(2) "Applied as a dust to the surface and slightly within many nests of *Pogonomyrmex badius* (Latr.), *Solenopsis geminata* (F.), *Dorymyrmex pyramicus* (Rog.), *Dorymyrmex pyramicus* var. *flavis* (McCook), *Pheidole dentata* (Mayr), and *Parotrechina longicornis* (Latr.) by means of a small bellows duster, sodium fluoride gave complete control in every instance, usually within a day or two with only one application."

(3) "The success and simplicity of this method indicates that sodium fluoride might well be substituted for fumigants in ant control."

The Local Use of Sulfonamide Compounds in Dermatology. Harold N. Cole, in the October 16, 1943, issue of the *Journal of the American Medical Association*, makes the following summary:

1. Sulfonamides have a local bacteriostatic, and under some conditions probably bactericidal, action in certain infections of the skin. This action is interfered with by excess pus cells, secretion, bacteria and crust formation. Hence, careful debridement is an essential to all sulfonamide therapy.

2. Sulfonamides act particularly well locally in powder form in chancroidal infection and in an oil in water emulsion base in impetigo, in ecthyma, and in acute pyococcal infections. However, they should not be used in these conditions, except in chancroidal infection, until other measures have failed.

3. In the light of present data, sulfonamides should not be administered locally for more than five days because of the danger of sensitizing the individual and perhaps later precluding internal sulfonamide therapy where the situation may involve a far graver disease—e. g., a pneumonia or a bacteremia.

4. The use of sulfonamide ointments should be limited to use directly under the care of a physician.

Ascorbic Acid Content of Late Winter Tomatoes. Many people have wondered whether the late winter and early spring tomatoes found on the market would differ as much from field-grown, vine-ripened tomatoes in their ascorbic acid content as they differ in color, taste and appearance. This question has been answered (Holmes, Jones, Ritchie—*New England J. Med.*, Sept. 16, 1943). The ascorbic acid content of such late winter tomatoes obtained from six local stores was found to be only about one-third that usually found in summer tomatoes.

A Treatment for Pediculosis Capitis. William A. Davis, in the November 27, 1943, issue of the *Journal of the American Medical Association*, states that the ideal treatment for pediculosis capitis should:

- (1) Be applicable in the form of a lotion.
- (2) Rapidly kill lice and nits.
- (3) Be free of greasiness, disagreeable odor, tendency to stain.
- (4) Be cheap and lasting.
- (5) Be non-irritating.

The author recommends a lotion with the following formula as meeting these requirements: Phenylcellosolve, 40 per cent; ethanol, 30 per cent; water, 25 per cent; methyl salicylate, 5 per cent.

The lotion is applied to the scalp until the hair is thoroughly wet. Precautions are taken for keeping the fluid out of the eyes and mouth. Nothing further beyond this initial treatment is usually necessary.

Epidemic Hepatitis—not Catarrhal Jaundice. In 1939 Iverson and Roholm showed that liver biopsy, though not without risk, was a practicable and useful procedure (*Acta Med. Scand.*, 1939, 102, 1; and *Acta Path. Microbiol. Scand.*, 1939, 16, 427). Now Dible, McMichael and Sherlock (*Lancet*, Oct. 2, 1943) report on the use of aspiration biopsy to study 56 adult cases of epidemic hepatitis (acute infective jaundice). Pathological study of the biopsy specimens of an average size of 2 by 20 mm. revealed, in 12 out of the 56 hospital cases, histological damage to more than 50 per cent of the liver cells.

This study strongly supports the belief that hepatitis, not obstruction of the ampulla of Vater by a plug of mucus and not catarrhal inflammation of the biliary tree, is the primary lesion in acute infective jaundice.

This study (added to that of Van Rooyen and Gordon, who in 1942 by intubation studies found no evidence of duodeno-biliary catarrh in these cases) would seem to indicate that the terms "catarrhal jaundice" and "acute infective jaundice" should be abandoned and the term "epidemic hepatitis" substituted.

Grandmothers as Typhoid Carriers. In a recent issue of *California's Health* it is reported that of 21 cases of typhoid reported to the Los Angeles City Health Department in the preceding sixteen months, 11 had been traced to carriers and 10 of these carriers were grandmothers. The explanation of this phenomenon brought out the following facts: (1) grandmothers lived in a period when typhoid was rampant in the United States, and many of them therefore suffered an attack; (2) about 2 per cent of persons having typhoid are known to become chronic carriers; (3) grandmothers are frequently engaged in the preparation of food in the home; (4) grandmothers lived in a day when bacteriology and sanitation were not as well developed as they are today and when health teaching in the schools was but little developed.

St. Louis Encephalitis Transmitted by Mosquitoes. As the result of carefully conducted experiments by Hammon and Reeves (*J. Exper. Med.*, Oct., 1943) it would appear that the evidence is now uncontrovertible (a) that *Culex tarsalis*, *Culex pipiens*, and several less common species of mosquitoes play an important part in the transmission of St. Louis encephalitis virus in our western states; and (b) that domestic fowls may serve as reservoir hosts for St. Louis encephalitis virus while suffering from a symptom-free viral septicemia.

Typhoid Vaccine for Pityriasis Rosea. Though pityriasis rosea is not a disease that is serious, it frequently continues to plague the patient with its disfiguring lesions for a week or two. It is therefore of interest that Ebert and Otsuka (*J.A.M.A.*, Dec. 18, 1943) report that one single intramuscular dose of typhoid vaccine causes an abortive involution of this troublesome disease. The recommended dose is 100 to 150 million killed typhoid bacilli for an adult, 20 million for a four-year-old child, 50 million for children five to thirteen years of age.

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ENTER GERIATRICS

Benjamin Disraeli once said in the British Parliament, "public health is the foundation on which rests the happiness of the people and the welfare of the nation. The care of the public health is the first duty of the statesman." Dr. Herman M. Briggs, an early public health authority in New York, supplemented Disraeli's historical words in significant manner when, in 1911, he said, "Public health is purchasable. Within natural limitations, any community can determine its own death rate."

It may be superfluous to reiterate here that the lengthening of the life span has been due chiefly to progress in caring for the very young. Pasteurization of milk probably has done more than any other measure to reduce infant mortality. Inoculation against the infectious diseases of childhood ranks next. The use of diphtheria antitoxin, even before our almost universal use of vaccines, accounted for considerable reduction.

In addition to the deaths that, in prepasteurization days, physicians so frequently and regretfully had to certify as due to cholera infantum, there was another disease of the intestinal tract, typhoid fever, that counted its victims by the thousands, chiefly among those in youth and early life. Osler used to say that typhoid fever was everywhere an index of the sanitary intelligence of a community and his statement has been borne out by the fact that purification of our water supply has been the chief factor in reducing its incidence. We have made some progress in the prevention and treatment of tuberculosis and diabetes at all ages, and probably heart disease and cancer in certain stages, but when it comes to the diseases of metabolism in advancing years we simply have accepted them with perfect resignation as "signs of old age" and allowed them to take their course. Geriatrics now is coming to the rescue and we have hope that it will accomplish great things.

A. E. H.

WHEN A UNIVERSITY NEEDS A FRIEND

The University of Minnesota has just passed through an acute episode which bears some resemblance to an intestinal obstruction. There has been fecal vomiting and severe colic, but the patient appears now to be on the road to recovery. However, the danger of recurrence is very real, and major surgery may be required if the trouble recurs.

The recent strike of non-academic employees at the University of Minnesota is an evidence of a deep-seated disturbance which cannot be passed off as simply another evidence of the irresponsibility of labor groups. The work stoppage in the University Hospitals was unpardonable, and there is much doubt as to whether any strike against the State is legitimate. But neither of those questions negates the fact that the wages of many University employees are too low and that their hours of service are in many instances unusually high. The basic difficulties have not yet been settled.

The physicians of Minnesota and the Northwest have two grounds for interest in the present University situation: first, they have a right to concern themselves about the disruption of hospital service to sick people; and second, they are vitally concerned in the maintenance of a high calibre medical school in this region. Therefore, even the conditions of labor of the non-academic employees in the University of Minnesota are not outside their sphere of personal interest.

Aside from unfortunate attitudes toward the personnel problem, the major fundamental difficulty at the University of Minnesota is a shortage of funds to do its job. The State appropriation for the maintenance of its University is just a little more than half of the appropriation made by other States for the support of universities of comparable size. One of three things must happen at the University of Minnesota. Either it must give up its attempt to do high quality work and let its more valuable staff members go, thus lowering its academic staff budget costs, or it must sharply limit its enrollment, denying a college education to many properly qualified, intelligent young people in the State who desire it, or it must obtain additional funds for support. There are no other possibilities.

To adopt the first of the three alternatives would be to abandon the whole purpose of a University. To adopt the second would be a denial of one of the major premises of a democracy. One is left only with the alternative necessity of finding more funds for support.

A great University is not a luxury. It is a *sine qua non* for survival of the people. About 0.2 per cent of the total income of the people of the State of Minnesota now goes for public higher education. In these terms it appears to be but a pittance compared with its value to the State. Less than 0.02 per cent goes into medical education, education which supplies much more than half of the physicians of the State. The great question which physicians and other friends of the people of the State of Minnesota must answer is whether they can honestly tolerate spending so little on the greatest investment any community can make, the education of the coming generation for service and progress.

Education is a capital investment. It is the greatest capital investment a community can make for its people. It pays dividends in healthier, happier, fuller lives.

The University of Minnesota is at a turning point. It needs friends, friends who will make it their business to help prevent the deterioration that is certain unless positive leadership turns the tide that is now running it towards its ruin. It needs friends who will help it to double its currently available funds for support.

THE OLD GUARD

The heavy demands of the armed forces on the younger age group of physicians has made it necessary for many of the older ones, who now would normally be beginning to think of taking things more easily, to work harder than ever. This is true especially in the smaller communities where one physician alone is often seen carrying the entire load. Many of them are working under the added handicap of physical disability, carrying on, in many instances, extracurricular duties by serving on school boards, doing public health work, making selective service examinations and doing other unremunerative tasks, losing sleep many nights a month, and always putting in long hours each day.

The civilian service of these men is as patriotic as their military service would be. Many would be in the armed forces if they could be, having been disappointed when they were rejected on account of age or disability. As it is, they are highly useful and necessary. They do their best to keep the families of the members of the armed forces in good health, as well as others who try to maintain as normal conditions on the home front as they can, until the good time comes when the war is over and all can be together again.

In many instances, these doctors have spent most of their professional lives in one community where they have earned an honored name justly. Fifty years ago, when many of them were graduated, the status of medical education was very different from that of today, and graduates of that period started out with very little training and even less equipment. All honor to them, that they kept up their reading, their medical society attendance, and made occasional trips for postgraduate study. Thus, in many cases, were they educated, practicing their profession at the same time, under conditions of unbelievable hardship, with bad roads, storms, and difficult modes of transportation.

Seventy-four years ago this month, the JOURNAL-LANCET, in its original form, first appeared, and during the years which have elapsed since, it has seen medicine and surgery, in all their ramifications, develop from the most primitive beginnings. It has been a potent factor in helping the practitioners of the area in which it circulates to keep abreast of the times, both in scientific medicine and in the field of medical organization.

The "Old Guard" in medicine is losing its members one by one, and the ranks are markedly thinner. But they have left splendid records, and the medical history of the middle west as set forth in the files of the JOURNAL-LANCET contains many illustrious names.

G. C.

Book Reviews

Pathology and Therapy of Rheumatic Fever, by LEOPOLD LICHTWITZ, M.D., edited by MAJOR WILLIAM CHESTER, M.D. New York: Grune and Stratton, Inc., 225 pages, 69 illustrations, 1944, price \$4.75.

The author, late clinical professor of medicine at Columbia University, devoted much of his life to the study of pathology of function. The manuscript of this book, which undertakes to untangle some of the complexities of rheumatism, was delivered to the editor shortly before Professor Lichtwitz' death.

Rheumatic fever is presented as a protean disease striking primarily at tissues of mesenchymal origin, hence the appearance of local lesions in any part of body. The fibrous tissues of the joints and their surrounding structures, the valvular apparatus of the heart, and various fibroserous membranes are therefore most commonly affected.

Of greatest value to those who seek a new stimulus to their thinking about rheumatic fever is the consideration of the disease as an allergic manifestation, essentially a reaction of defense and not of invasion. There is a full presentation of treatment both old and new, including chemotherapy in prevention. The illustrations and bibliography are excellent. Not the least of the attractions of the book is the foreword by Dr. William J. Maloney, who, from his early days as a medical student in Edinburgh, home of Maclagan who popularized salicin in rheumatism, has never ceased his profound interest in rheumatic fever.

Lymphogranuloma Venereum—a monograph, information collected by the Squibb Institute for Medical Research. New York; 32 pages, mailed free to physicians identifying themselves and to public health officials. Professional Service Department, E. R. Squibb & Sons.

Noteworthy contributions to the detection and differential diagnosis of lymphogranuloma venereum are those of Rake, McKee and Shaffer, who have cultivated the agent in the yolk sac of the embryonated chicken's egg and obtained concentrated suspensions of elementary bodies. In this manner a highly purified and specific antigen, known as Lygranum S. T. has been prepared which is rapidly supplanting antigens prepared from either human pus or mouse brain. These workers alone, and in collaboration with Dr. A. W. Grace, have used the yolk sac antigen for the complement-fixation testing of serum suspectedly infected patients. The specificity and sensitivity of this antigen (Lygranum C. F.) provides an additional means of detecting early cases of lymphogranuloma venereum.

In the course of investigations involving these tests, there accumulated at the Squibb Institute for Medical Research a considerable mass of information concerning the properties of the causative agent, the epidemiology and clinical aspects of the disease. To facilitate the work of investigators and teachers in this field, and perhaps to encourage the interest of potential investigators, practicing physicians and health officers, it was decided to compile and publish the information at hand. The result is a 32-page publication entitled *Lymphogranuloma Venereum*—a Monograph. The value of the book is enhanced by maps, charts and numerous illustrations in color.

The monograph is available gratis to physicians and to public health officials, and will be a valuable addition to medical college libraries. Those who request copies should enclose their professional card or use their professional letterhead.

Eclipse of a Mind, by ALONZO GRAVES. New York: Medical Science Press, 736 pages, 1940, \$5.

This is a psycho-autobiographic study of a case of manic-depressive psychosis. In recent years there have appeared many books written by mental patients on what they have gone through in mental hospitals. These accounts have been greatly

limited because they have been written after the patient had left the hospital and more as a justification of the illness than as an attempt to understand its meaning. Without true insight into the cause of their illness, and recalling only the superficial events of their hospitalization, the patients have left the institution without really comprehending the nature of their illness.

The Eclipse of a Mind stands in unique contrast to other books in that it was written by the patient while he was still in the hospital and under the guidance of a competent psychiatrist, who helped him to trace back his progress toward insanity and to ferret out the meaning and significance of the reaction. Beginning with the year 1640, there is sketched in broad outline the genealogical genesis of a psychosis and its projection through successive generations to its manifestation in the patient himself.

This book is important not only for its picture of the development of a psychosis but for what it reveals of the thoughts and feelings of a highly intelligent man tragically enmeshed in a morbid circle and doomed to recurrent frustration.

News Items

The annual dinner meeting of the Aberdeen (South Dakota) District Medical Society was held on January 18 in Aberdeen. Officers elected for the coming year are Dr. J. A. Eckrich, Aberdeen, president; Dr. E. A. Rudolph, of Aberdeen, vice president; and Dr. J. D. Alway, of Aberdeen, secretary. Drs. J. D. Whiteside and J. D. Alway were named delegates.

Speaker at the meeting was Dr. Miland E. Knapp, of Minneapolis, who discussed "The Kenny Treatment of Infantile Paralysis."

Officers elected at the recent meeting of the Cascade County (Montana) Medical Association are Dr. Fritz D. Hurd, of Great Falls, president; Dr. Harold Fuller, of Great Falls, vice president; and Dr. Charles Little, of Great Falls, secretary.

Dr. John D. Graham, of Devils Lake, North Dakota, was elected president of the Devils Lake District Medical Association at the annual meeting in January. Other officers include Dr. J. G. Vigeland, of Brinsmade, vice president; Dr. John C. Fawcett, of Devils Lake, secretary-treasurer; and Dr. J. A. Engesather, Brocket, alternate delegate.

Two Montana doctors have recently been appointed official physicians for their respective counties. They are Dr. A. T. Munro, of Kalisøell, who is physician for Flathead County, and Dr. Harry J. McGregor, of Great Falls, who was re-appointed physician of Cascade County.

Dr. H. L. Koehler, of Polson, Montana, has joined the staff of the Northern Pacific Hospital in Missoula, after several years' practice in Polson.

Dr. Charles A. Aldrich has recently joined the staff of the Mayo Clinic as a member of the section on pediatrics. Dr. Aldrich is a graduate of Northwestern University and has done postgraduate work at Harvard.

Dr. and Mrs. E. J. Richardson, of Baltimore, have arrived in Pierre, South Dakota, where Dr. Richardson is hospital physician at St. Mary's Hospital. Dr. Richardson, a graduate of Johns Hopkins Medical School, will replace Dr. John Egan, who has returned to Johns Hopkins for further study.

At the annual election of the Silver Bow County Medical society, held on December 22 in Butte, Montana, Dr. J. E. Garvey was elected president. Other officers include Dr. Peter T. Spurck, vice president; Dr. S. V. Wilking, secretary; and Dr. Charles R. Canty, treasurer.

Dr. Stephen L. Odgers, who recently joined the staff of the Murray Hospital as orthopedic surgeon, was elected to membership in the society.

The Seventh District Medical Society of South Dakota has elected Dr. George Stevens, of Sioux Falls, president; Dr. J. A. Kittelson, of Sioux Falls, vice president; and Dr. C. J. McDonald, of Sioux Falls, secretary-treasurer. Dr. William Sercl, also of Sioux Falls, was named to the board of censors, and Drs. J. A. Nelson and O. Charles Erickson, both of Sioux Falls, were appointed to the board of directors.

Dr. J. L. Mondloch, of Butte, Montana, has been appointed Silver Bow County physician, succeeding Dr. John S. Floyd, and Dr. John J. Elliott, of Lewistown, Montana, has been appointed Fergus County physician, succeeding Dr. Curtis Wilder.

A Grand Forks, N. D., physician, Dr. R. O. Goehl, has been elected a fellow of the American College of Physicians. Dr. Goehl, a graduate of the University of Minnesota Medical School, is associated with the Grand Forks Clinic.

Officers elected recently at a meeting of the Mount Powell Medical Society of Montana are Dr. Kenneth A. Tyler, of Galen, president; Dr. R. M. Snodgrass, of Anaconda, vice president; Dr. W. E. Long, of Anaconda, secretary-treasurer; and Dr. F. I. Terrill, of Galen, and Dr. L. G. Dunlap, of Anaconda, delegates to the state medical association.

Dr. F. C. Waniata, of Great Falls, Montana, has been commissioned a first lieutenant in the Army medical corps and ordered to active duty. After a six weeks' indoctrination course at Camp Berkeley, Texas, Dr. Waniata will report to the General Hospital at Charleston, S. C. Practicing medicine in Great Falls since 1936, Dr. Waniata was a member of the North Montana clinic.

Also assigned to duty in the Army medical corps is Dr. E. K. George, of the Northern Pacific Hospital staff in Missoula, Montana. Dr. George, a first lieutenant, is stationed in Charleston, S. C.

The newly-elected president of the Yellowstone Valley Medical Society of Montana is Dr. A. L. Hammerel, of Billings. Other officers elected for the coming year are Dr. Wayne Gordon, of Billings, vice president; Dr. Herbert T. Caraway, of Billings, secretary; and Dr. A. E. Stripp, of Billings, treasurer.

Following the election of officers, a scientific paper on "Ileitis" was read by Dr. J. I. Wernham. Motion pictures showing skin grafting and varicose veins were also presented.

Dr. Freeman Gilbert has returned to Belle Fourche, S. D., after study in California, Colorado, and Chicago, to establish his office.

Dr. J. H. Barthell, of Hazen, North Dakota, was elected president of the Hazen Memorial Hospital recently.

Dr. W. D. Farrell, of Aberdeen, South Dakota, has been re-appointed county physician by the Brown County commissioners.

Dr. Paul A. Gronvall was given a dinner at the Minneapolis Club recently by his associate in practice, Dr. A. E. Johnson, before Dr. Gronvall was to report at Great Lakes Naval Station. Dr. Gronvall now occupies the office of Chief Surgeon at Great Lakes.

Necrology

LEWIS MORGAN DANIEL

The recent death of Lewis Morgan Daniel has taken away in his prime a member of our guild who was endowed with high professional attainments, a keen wit, a ready pen, and a lovable personality. Modest and retiring, he disliked any kind of notoriety, and it was only because his sterling qualities were so evident that he was often pushed forward by his friends to perform duties entailing some publicity for himself, publicity that he would never have sought otherwise.

He had a rare style in his writing. There was no waste of words, and yet everything he turned out was complete in itself, in language that was peculiarly personal to Dr. Daniel. One could wish that he had made more of a business of writing, for he had both original ideas and a unique mode of expression.

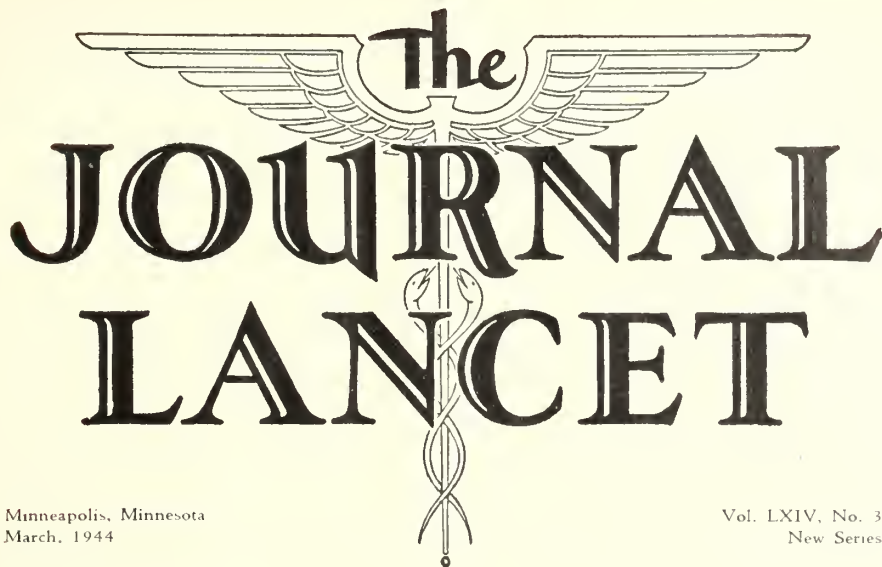
He was a kindly soul whose friends will miss him greatly. He was a gentleman, a scholar, and a keen observer of human nature—a rare type and an unusual combination.

GILBERT COTTAM, M.D.

Dr. G. E. Stromberg, of Langdon, S. D., died after a two weeks' illness on December 21, 1943, at his home. A graduate of the University of Illinois Medical School, Dr. Stromberg had been practicing in North Dakota since 1911.

Dr. Serge Androp, formerly of Richey, Montana, died recently in California at the age of 55. Dr. Androp, who was one of the first to introduce electric shock therapy in the United States, had a distinguished record for services in the first World War, after which he was active in the officers' reserve corps, receiving his commission as colonel in 1932. In 1935 he was graduated from the school of aviation medicine at Mitchell Field, L. I., as a flight surgeon.

Dr. A. E. Johnson, 72, of Watertown, S. D., died on December 30, 1943. He was a graduate of the University of Minnesota Medical School and was a member of the American College of Surgeons.



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Tuberculosis Among Children of Pre-School Age*

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BETWEEN May 31, 1921, and November 1, 1941, 5537 children, from birth to five years of age, visited our tuberculosis clinic at the Lymanhurst Health Center. These children have been divided into Group I, consisting of those examined during the first ten years, and Group II, consisting of those first examined during the second ten years of this period.

GROUP I

Results of Tuberculin Test

During the first ten-year period, 2403 children, ranging from birth through five years of age, were examined in our clinic for the first time. The result of the tuberculin test was not recorded in 37. This number included children whose parents refused to give consent for the test, those who could not be located for reading, etc. Of the remaining 2366 children, 1680 (71 per cent) did not react, and 489 (20.7 per cent) reacted to tuberculin, while in 197 (8.3 per cent) the reactions were recorded in such a way that we classified them as questionable (Table I). During the greater part of this period we used the dermal test of Pirquet almost exclusively, and for this study any child whose record showed the diameter of the reaction area to be less than one-fourth inch was classified as a questionable reactor. Unfortunately, in such cases the test usually was not repeated.

Among the 1680 non-reactors on first examination, 125 were found to be reactors at some subsequent time.

*Prepared with the aid of a grant from the research fund of the University of Minnesota. From the records of Instituto de Tisiologia (service of Prof. G. Sayago), Cordoba, Argentina, the Lymanhurst Health Center, and the Medical School of the University of Minnesota, Minneapolis.

Results of Other Phases of Examination

NON-REACTORS TO TUBERCULIN THROUGHOUT OUR PERIOD OF OBSERVATION

Of the 1555 non-reactors to tuberculin, 167 did not have x-ray film inspections of their chests (Table II). Among the 1388 whose examinations included such inspections, 1355 had *no abnormal findings*, 13 had *pleural changes*, 15 developed *non-tuberculous pulmonary disease*, and 5 presented evidence of *calcium deposits*. One child who did not react developed tuberculous meningitis, as follows:

*3431. This girl of nine months was first examined on January 19, 1926. There was history of exposure but she did not react to the dermal test of Pirquet. No evidence of disease was detected in either lung. In April 1926 she was admitted to a sanatorium with non-tuberculous otitis media. The tuberculin test was not administered, and she died in the institution in May 1926 of tuberculous meningitis, as determined by examination of spinal fluid and postmortem studies. We believe this child was infected after we first saw her.

The length of time these 1388 non-reactors to tuberculin have been followed amounts to 8569 person life years of follow-up experience.

QUESTIONABLE TUBERCULIN REACTORS

Among the children first examined from birth to five years of age, there were 197 who reacted questionably to tuberculin, of whom 20 did not have x-ray film inspections of their chests. Of the remaining 177, *no evidence*

TABLE I
Results of Tuberculin Test on First Examination
Group I

Age in Years	Total Number	No Test	Children Considered	Non-Reactors		Questionable Reactors		Reactors	
				Number	Per Cent	Number	Per Cent	Number	Per Cent
Birth to 1	310	5	305	270	88.5	14	4.6	21	6.9
1	265	6	259	188	72.6	19	7.3	52	20.1
2	411	6	405	273	67.4	37	9.1	95	23.4
3	404	7	397	275	69.2	34	8.6	88	22.2
4	458	7	451	304	67.4	39	8.6	108	23.9
5	555	6	549	370	67.4	54	9.9	125	22.8
Total	2403	37	2366	1680	71.0	197	8.3	489	20.7

of disease was found on x-ray film inspection in 162. Among the remaining 15, one had evidence of *pleurisy*, one had *non-tuberculous pulmonary disease*, in one the *diagnosis was undetermined*, and 4 presented evidence of *calcium deposits*. Four children were seen when the *first infection type of tuberculosis was in the pneumonic stage*.

One child subsequently developed the *reinfection type of pulmonary tuberculosis*, as follows:

3513. This girl of five years was first examined on February 20, 1926. There was no history of exposure, but she was a questionable reactor to the dermal test of Pirquet. Her chest appeared clear. She was not seen again until February 7, 1935, when she reacted to tuberculin. At this time there was evidence of a small calcium deposit at the level of the left second interspace, anteriorly. In February 1937 a small area of disease was found at the level of the right second interspace, anteriorly. In August 1939 disease was present in the right lung at the level of the third interspace, anteriorly. In September 1939 she was admitted to a sanatorium with moderately advanced disease with tubercle bacilli in her sputum. Artificial pneumothorax was instituted on the left side and she was discharged in May 1941 as an arrested case. She continues to receive artificial pneumothorax treatment in a clinic. The last examination in September 1941 revealed no change in her lung condition.

Three children who at first reacted questionably to tuberculin developed *extrathoracic tuberculosis* as follows:

*4504. This girl of one year was first examined on March 8, 1927. There was history of exposure but she reacted only questionably to the dermal test of Pirquet. No evidence of disease was found in either lung. She was not returned to our clinic but died on June 24, 1927, from tuberculous meningitis.

1594. This girl of two years was first examined on November 15, 1923. There was history of exposure and she was a questionable reactor to tuberculin. Both lungs appeared clear. She was already under treatment for tuberculosis of the left ankle and right shoulder. In April 1924 she was admitted to a sanatorium, from which she was discharged in December 1933. She was readmit-

TABLE II
Results of Examinations
Non-Reactors to Tuberculin Throughout Period of Observation
Group I

Age in Years	Total Number	No X-ray	Children Considered	X-ray Negative	Pleurisy	Non-tuberculous Pulmonary Disease	Calcification	Reinfection Type of Clinical Tuberculosis Subsequently
Birth to 1	260	122	138	133	0	3	2	1
1	173	15	158	156	0	2	0	0
2	255	13	242	234	4	4	0	0
3	256	8	248	243	3	0	2	0
4	273	7	266	261	1	3	1	0
5	338	2	336	328	5	3	0	0
Total	1555	167	1388	1355	13	15	5	1

ted in November 1934 and discharged in June 1938. At that time she was classified as having tuberculosis of the right shoulder and lumbar spine, quiescent, and apparently controlled tuberculosis of the left ankle and left hip. At present she is apparently doing well.

1450. This boy of five years was first examined on September 6, 1923. There was no history of exposure, but he was a questionable reactor to tuberculin. He had a diagnosis of tuberculosis of the right hip joint at that time and was already under the care of an orthopedist. His chest appeared clear at that time and also in March 1925, but he was then a definite reactor to tuberculin. In May 1931 he was admitted to a sanatorium with a diagnosis of tuberculosis of the right hip. He was not treated surgically. He was discharged in December 1933 when his disease was classified as apparently arrested. Tubercle bacilli were never found in the sputum. Inspection of his chest in April and November 1934 revealed no evidence of disease. He moved out of the city and has not since been traced.

The length of time the 177 questionable reactors have been followed amounts to 955 person life years of follow-up experience.

TUBERCULIN REACTORS ON FIRST EXAMINATION

Among the 489 tuberculin reactors on first examination, 11 did not have x-ray film inspections of their chests. Of the remaining 478, the *films of the chest were clear* in 229 (Table III). Among the reactors to tuberculin, 16 had evidence of *pleural change*, such as diaphragmatic adhesions, and another had spontaneous pneumothorax. Four children had *non-tuberculous pulmonary disease* at some time during our observation. In 6 children, pulmonary disease was found, but the *diagnosis was not determined* because there was no opportunity to complete the examinations. In these cases there were only the tuberculin reaction and the x-ray shadows, which were not adequate for final diagnoses. Among the children who reacted to tuberculin, 150 presented evidence of *calcium deposits* only at some time during our period of observation. These were in the lung parenchyma, the hilum, or both.

In 48 children, the *first infection type of tuberculosis was observed in the pneumonic stage*, but in each case the

TABLE 111
Results of Examinations
Tuberculin Reactors on First Examination
Group I

Age in Years	Total Number	No X-ray	Children Considered	X-ray Negative	Pleurisy	Non-tuberculous Pulmonary Disease	Diagnosis Undetermined	Calcification	First Infection Type of Tuberculosis Pneumonic Stage	Reinfection Type of Pulmonary Tuberculosis on First Examination	Reinfection Type of Pulmonary Tuberculosis Developed Subsequently	Extra-thoracic Tuberculosis (Reinfection Type)
Birth to 1	21	1	20	9	0	0	1	3	4	0	1	2
1	52	0	52	20	1	2	0	16	8	0	1	4
2	95	2	93	43	2	0	0	28	13	0	3	4
3	88	2	86	40	7	0	0	29	8	0	2	0
4	108	3	105	48	4	1	3	37	9	0	1	2
5	125	3	122	69	5	1	2	37	6	0	2	0
Total	489	11	478	229	19	4	6	150	48	0	10	12

lesions receded in the usual manner without causing significant illness.

No child was found to have the *reinfection type of pulmonary tuberculosis* on first examination. However, this type of disease developed subsequently in 10 children (Table VII). Brief histories of their cases are as follows:

Acute Pulmonary Tuberculosis. *1102. This boy of nine months was first examined on April 12, 1923. There was history of exposure and he reacted to tuberculin. There was no evidence of disease in either lung; however, he died of tuberculous pneumonia on May 29, 1923.

*3273. This girl of sixteen months was first examined on November 24, 1925. There was history of exposure and she reacted to tuberculin. There was no evidence of disease in either lung. She died on December 22, 1925, of pneumonia which, we believe, was tuberculous.

Chronic Pulmonary Tuberculosis. *1399. This girl of two years was first examined on August 7, 1923. There was no history of exposure but she reacted to tuberculin. There was evidence of enlargement of the hilum on the left side. The mother refused to have her return to our clinic, but in 1929 and 1934 she stated that the child's health was excellent. She was admitted to a sanatorium on March 28, 1938, with pulmonary disease, moderately advanced. Artificial pneumothorax was attempted on the left side but collapse was prevented because of adhesions. Left phrenicectomy was performed and pneumoperitoneum was administered, but she died in November 1938.

912. This girl of two years was first examined on February 1, 1923. There was history of exposure and she reacted to tuberculin. Apparently x-ray film inspection was not made of her chest at that time. However, in April 1927, calcium deposits were present in the left lung and hilum region. Examinations through April 1929 revealed no change. We did not see her again, but in 1939 she was reported to have pulmonary tuberculosis involving the upper lobe of each lung. Her private physician treated her by strict bed rest for many months. However, the disease tended to progress and in August 1941 there was evidence of cavitation in the upper lobe of each lung.

4973. This girl of two years was first examined on October 6, 1927. There was history of exposure and she

reacted to tuberculin. Both lungs appeared clear, but in June 1930 there was evidence of calcium deposits in the hilum region on each side and in the base of each lung. Numerous periodic examinations through October 1940 revealed no change. However, in October 1941, disease was found in the right lung, extending from the apex to the level of the second rib, anteriorly. She was admitted to a sanatorium in December 1941, where artificial pneumothorax was instituted on the right side.

6494. This girl of three years was first examined on April 4, 1929. There was history of exposure and she reacted to tuberculin. The lungs appeared clear. This was also true in March 1930. In May 1934 there was evidence of calcium deposits in the upper lobe of the left lung. In June 1935 a definite area of disease was found in the right lung at the level of the second interspace, anteriorly. In August 1935 this had increased slightly in extent. In October 1937 and May 1938 there was no change, and in January 1939 there was evidence of calcification at the level of the right first interspace, anteriorly, while the shadow in the right second interspace had decreased in size. There was also evidence of calcium deposits in the left apex. In July 1940 a small area of disease was found in the left lung at the level of the first and second interspaces, anteriorly. In September 1941 there was marked increase of the disease in the right upper lung field and tubercle bacilli were recovered from the sputum. She was admitted to a sanatorium in October 1941.

3220. This girl of three years was first examined on October 29, 1925. There was history of exposure and she reacted to tuberculin. She had tuberculosis of the *bones of the right ankle including the head of the astragalus, distal end of the os calcis, practically all of the scaphoid, and the proximal articular surface of the cuboid.* There was no evidence of disease in either lung. She was admitted to a sanatorium in December 1925, where the disease was treated surgically. She was discharged in August 1930. Numerous periodic examinations of the chest revealed no abnormal findings until February 1940, when a definite area of disease was present in the right lung at the level of the first interspace, anteriorly. Tubercle bacilli were recovered from the sputum on two occasions. She was readmitted to a sanatorium in March

1940 with moderately advanced pulmonary tuberculosis. Artificial pneumothorax was instituted on the right side but was discontinued because of accumulation of pleural fluid. Phrenicphraxis was then performed. She is still in the sanatorium and her condition is improving.

7416. This girl of four years also developed pulmonary tuberculosis subsequently to our first examination. Her case is described under extrathoracic tuberculosis because she also had disease of one of the bones.

5447. This boy of four years was first examined on March 9, 1928. There was history of exposure and he reacted to tuberculin. Both lungs appeared clear. Periodic examinations through January 1938 revealed no evidence of disease. In January 1939 an area of disease was found in the left lung adjacent to the cardiac margin at the level of the fourth and fifth ribs, anteriorly. This remained unchanged through January 1941.

5240. This girl of five years was first examined on January 12, 1928. There was history of exposure and she reacted to tuberculin. No evidence of disease was found in either lung. In 1929, 1937 and 1938 the lungs appeared clear. However, in January 1939 an area of disease was present in the right lung at the level of the second interspace, anteriorly. This was still present but apparently had not changed in June 1940, when she was admitted to a sanatorium. In February 1941 the area of disease in the right lung had increased in size and artificial pneumothorax was instituted. She is still in a sanatorium.

6811. This girl of five years was first examined on June 28, 1929. There was history of exposure and she reacted to tuberculin. Her lungs appeared clear. In July 1930 there was evidence of calcification in the left hilum region. Because of enlargement of the cervical lymph nodes, this child was admitted to a sanatorium in August 1931 and discharged in September 1932. On discharge, these nodes had definitely decreased in size and the lungs were clear, except for evidence of calcium deposits in the left hilum region. Periodic examinations revealed no change until April 1938 when a small area of disease was found in the extreme apex of the left lung. This remained unchanged through 1939 but in December 1940 and April 1941 it had increased in size. In August 1941 it appeared unchanged.

Extrathoracic Tuberculosis. There were 12 children who had or developed extrathoracic tuberculosis. Brief histories of their cases are as follows:

899. This girl of one year was first examined on January 26, 1923. There was history of exposure and she reacted to tuberculin. No x-ray inspection was made of her chest at that time. In December 1927 an orthopedist reported her as having tuberculosis of the left knee. In February 1928 calcium deposits were present in both hilum regions and in the base of the right lung. In March 1931 there was also evidence of a calcium deposit in the apex of the left lung. Periodic examinations of her chest through December 1937 revealed no change in the pulmonary condition. In 1941 she was attending college and was apparently in good health.

1002. This girl of two years was first examined on May 22, 1923. There was history of exposure and she

reacted to tuberculin. The lungs appeared clear. She was admitted to a sanatorium in September 1923 and discharged in February 1933, having been treated for tuberculosis of the fourth and fifth cervical *vertebrae* and the left shoulder joint. The girl was last seen in our clinic in October 1933 when there was no evidence of disease in her lungs.

171. This boy of two years was first examined on May 9, 1922. There was history of exposure and he reacted to tuberculin. Symptoms referable to his hands were present, and disease was found in the proximal and middle *phalanges* of the little finger on the right side and the proximal phalanx of the little finger on the left side. He was admitted to a sanatorium in May 1922 and discharged in April 1923 as a case of tuberculous dactylitis. The family then moved out of the city and he has not been traced.

6739. This boy of two and one-half years was first examined on June 4, 1929. There was history of exposure and he reacted to tuberculin. The lungs appeared clear. In the spring of 1930 he had a diagnosis of tuberculosis of the left *tibia and knee joint*. An operation was performed and the microscopic examination revealed a giant-cell tumor. He was admitted to a sanatorium in August 1932 and was discharged in September 1938. Exudate from the left knee fistula never was found to contain tubercle bacilli. However, another operation was performed on the knee in April 1937 and the pathologist reported the presence of tuberculosis. He entered a school for crippled children in 1938 and was discharged in good condition, in June 1940. He is now apparently in good health but is slightly lame.

3220. This girl of three years had tuberculosis of the bones and joints in addition to pulmonary tuberculosis. Her condition is described under the title of reinfection type of pulmonary tuberculosis which developed subsequent to our first examination.

7416. This girl of four years was first examined on February 27, 1930. There was history of exposure and she reacted to the intracutaneous test of Mantoux but failed to react to the dermal test of Pirquet. The lungs appeared clear. However, in May 1931 there was evidence of calcium deposits in the right hilum region. In June 1931 there was evidence of a destructive lesion in the neck of the left *femur* from which tubercle bacilli were recovered. Periodic examinations of the chest through June 1938 revealed no change. However, in July 1939 there was evidence of disease in the *left lung* extending from the apex to the level of the fifth rib, anteriorly. *Tubercle bacilli* were found in the *sputum*. She was admitted to a sanatorium in July 1939 and is still in the institution.

6983. This boy of four years was first examined in September 1929. There was history of exposure and he reacted to tuberculin. The lungs appeared clear, as was also true on July 3, 1930. On first examination he had tuberculosis of the right *hip*. In September 1931 there was evidence of a calcium deposit in the hilum region on the right side. The lung condition had not changed on periodic film inspection through December 1941.

TABLE IV
Results of Examinations
Non-Reactors Who Became Reactors to Tuberculin
Group I

Age in Years	Total Number	X-ray Negative	Pleurisy	Non-tuberculous Disease	Calcification	First Infection Type of Tuberculosis Pneumonic Stage	Reinfection Type of Pulmonary Tuberculosis	Extra-thoracic Tuberculosis (Reinfection Type)
Birth to 1	10	6	0	0	3	1	0	0
1	15	10	0	0	3	2	0	0
2	18	11	0	0	5	0	1	1
3	19	17	0	0	2	0	0	0
4	31	16	2	0	8	2	2	1
5	32	27	0	0	3	1	0	1
Total	125	87	2	0	24	6	3	3

*1570. This boy of six months was first examined on October 30, 1923. There was history of exposure and he reacted to tuberculin. The film of his chest was unsatisfactory, but another film on January 31, 1924, revealed evidence of disease in the left upper lobe, which was later found to represent a primary focus. In April 1924 tuberculosis was detected in the left knee. He died in a sanatorium from tuberculous meningitis in October 1924.

*2731. This girl of nine months was first examined on March 30, 1925. There was history of exposure and she reacted to tuberculin. The lungs appeared clear. She died in January 1926 of tuberculous meningitis.

*6516. This boy of two years was first examined on April 7, 1929. There was history of exposure and he reacted to tuberculin. His chest appeared clear except for increased linear markings in the right base. However, his temperature was 102° and he was definitely ill. He died of tuberculous meningitis on April 25, 1929.

*3867. This boy of fifteen months was first examined on July 14, 1926. There was history of exposure and he reacted to tuberculin. No evidence of disease was found in either lung. He died in August 1926 in a sanatorium, from miliary tuberculosis.

4133. This boy of seventeen months was first examined on December 5, 1926. There was history of exposure and he reacted to tuberculin. His lungs appeared clear. In March 1927 he was admitted to a sanatorium, where he was found to have tuberculosis of the adenoids. He was discharged in August 1930. He returned to our clinic in December 1931 and has reported periodically twenty times through February 1941. No evidence of disease has been found in either lung.

3922. This girl of two years was first examined on September 15, 1926. There was history of exposure and she reacted to tuberculin. Her lungs appeared clear. In January 1927 there was evidence of disease involving the upper lobe of the right lung. She was admitted to a sanatorium in April 1927, with a diagnosis of tuberculous cervical adenitis. When she was discharged in June 1930, the disease was classified as apparently arrested. Her lungs were clear. This family moved to another state in 1936 and she has not been traced.

The length of time the 478 children have been followed amounts to 4220 person life years of follow-up experience.

CHANGED FROM NON-REACTORS TO REACTORS

Among the 125 children who became reactors to tuberculin under our observation (Table IV), 87 had no abnormal findings revealed on x-ray film inspection of their chests, 2 showed evidence of pleurisy, and 24 presented evidence of calcium deposits in the lung parenchyma, the hilum, or both.

Six other children were seen while the first infection type of tuberculosis was in the pneumonic stage but no illness was experienced.

Three children developed the reinfection type of pulmonary tuberculosis, as follows:

2721. This boy of two years was first examined on March 26, 1925. There was no history of exposure and he did not react to the dermal test of Pirquet. His lungs appeared clear. He did not know of any exposure between 1925 and 1937. He was not seen again in our clinic, but in February 1937 he was admitted to a sanatorium with pulmonary tuberculosis, involving the right lung from the apex to the level of the fourth rib, anteriorly, and the left lung at the level of the second, third, and fourth interspaces, anteriorly. At this time he reacted to tuberculin. Artificial pneumothorax was satisfactorily instituted on the right side, but he is still on strict bed rest in the sanatorium.

4149. This girl of four years was first examined on December 2, 1926. There was history of exposure but she did not react to tuberculin. She was not examined again until September 1938 when she reacted to tuberculin, and there was evidence of disease in each lung at the level of the first and second interspaces, anteriorly. These areas of disease had not changed in October 1940, but in August 1941 they had decreased considerably in size.

4971. This boy of four years was first examined on October 5, 1927. There was history of exposure but he did not react to the dermal test of Pirquet. His chest appeared clear at that time and again in May 1928. In May 1929 he reacted to tuberculin, but no evidence of disease was found in either lung. In June 1930 calcium deposits were present in the right hilum region. Periodic examinations of his chest revealed increase in the size of the calcium deposit, with no other change until November 1936, when a small but sharply outlined area of disease was found in the apex of the right lung. This remained unchanged through October 1941.

Three children developed *extrathoracic, clinical tuberculosis* as follows:

*7060. This boy of two years was first examined on October 22, 1929. There was history of exposure but he did not react to tuberculin. Enlargement of the hilum was seen on each side. On November 14, 1929, he reacted to tuberculin. At this time he had a temperature ranging from 101 to 102° and died of tuberculous *meningitis* on January 2, 1930.

*365. This girl of five years was first examined on June 6, 1922. There was history of exposure but she did not react to the dermal test of Pirquet. Our x-ray film of her chest was unsatisfactory. She was admitted to a sanatorium in November 1923. She reacted to tuberculin on November 9, 1923, and there was evidence of increase in the markings extending from the left hilum region into the lung at the level of the first and second interspaces anteriorly, and a calcium deposit in the right lung at the level of the third interspace, anteriorly. While in the sanatorium she had *pleurisy with effusion* and died of tuberculous *meningitis* on November 13, 1924.

350. This girl of four years was first examined on June 5, 1922. There was history of exposure but she did not react to the dermal test of Pirquet. X-ray film inspection of her chest was not made until March 1925. At that time and again in December 1925 her lungs appeared clear. In October 1926 she reacted to tuberculin but her lungs remained clear. In January 1927 she was admitted to a sanatorium with a diagnosis of tuberculosis of the *sternum*. Tubercle bacilli were recovered from this lesion. While she was in the sanatorium there were no significant findings in her lungs. She was discharged in January 1929. In June of the same year there was partial obliteration of the right costo-phrenic angle and evidence of thickening of the pleura over the entire right lung, which was also present while she was in the sanatorium. Periodic examinations of her chest through September 1934, our last contact, revealed no change.

The follow-up experience for the 125 children who did not react to tuberculin on first examination, but who subsequently became reactors, amounts to 1227 person life years.

GROUP II

Results of Tuberculin Test

During the second ten-year period, 3134 children, ranging from birth through five years of age, were examined in our clinic for the first time. The results of the tuberculin test were not recorded in 25 because they could not be located for reading the tests, their parents refused consent, etc. Among the remaining 3109 children there were 2764 (88.9 per cent) who did not react to tuberculin (Table V). There were only 3 (0.01 per cent) whose reactions were questionable. Of the 3109 children tested, 342 (11 per cent) reacted to tuberculin.

Among the 2764 non-reactors to tuberculin on first examination, there were 73 whom we later saw as reactors.

Results of Other Phases of Examination

NON-REACTORS TO TUBERCULIN THROUGHOUT OUR PERIOD OF OBSERVATION

In Table VI it is shown that 2406 of the 2691 non-reactors throughout our period of observation did not have x-ray film inspections of their chests. This is because we had learned in our previous work that evidence of tuberculosis is almost never found in the chests of children who do not react to tuberculin. Therefore, we discontinued x-ray inspections of chests of non-reactors unless films were especially requested by parents or symptoms were present which indicated further examination.

Among the 285 children who did not react to tuberculin but had x-ray film inspections of the chest, 259 showed no evidence of chest disease. Two had evidence of *pleurisy*, and one had effusion. *Non-tuberculous pulmonary disease* was found in 12; in one the *diagnosis was not determined*; and in 10 there was evidence of *calcification* in the parenchyma, hilum, or both (Table XIII). In no child of this entire group of non-reactors was there evidence of *clinical tuberculosis* in any form.

The follow-up experience for these 285 non-reactors to tuberculin amounts to 837 person life years.

TUBERCULIN REACTORS ON FIRST EXAMINATION

Among the 342 tuberculin reactors on first examination, 7 did not have x-ray film inspections of their chests (Table VII). Of the remaining 335 the x-ray films were clear in 172. Four had evidence of *pleurisy*, two of whom had effusion. Two children had *non-tuberculous pulmonary disease*; in 6 there was pulmonary disease for which the *diagnosis was not determined*. There was evidence of *calcification* in the lung parenchyma, the hilum, or both, in 89 cases.

The *first infection type of tuberculosis in the pneumonic stage* was found in 54 children who had no external manifestations of this disease.

The *reinfection type of tuberculosis* was present on first examination in only 2 cases, as follows:

Acute Tuberculosis. *10725. This girl of nine months was first examined on January 19, 1933. There was history of exposure and she reacted to tuberculin. Evidence of disease was found throughout both lungs suggestive of miliary infection. She was immediately sent to a hospital where she died on March 10, 1933, from miliary tuberculosis.

*16863. This boy of one year was first examined on January 16, 1939. There was history of exposure and he reacted to tuberculin. Disease was found to involve the greater part of the base of the right lung, with small, sharply outlined areas throughout the remainder of both lungs. This was suggestive of miliary infection. In April 1939 the disease in the base of the right lung had decreased in size, but the evidence suggestive of miliary disease was still present. He was admitted to a sanatorium in May 1939 and died there the next September of miliary tuberculosis.

The *reinfection type of pulmonary tuberculosis developed subsequently* to our first examination in 4 cases, as follows:

TABLE V
Results of Tuberculin Test on First Examination
Group II

Age in Years	Total Number	No Test	Children Considered	Non-Reactors		Questionable Reactors		Reactors	
				Number	Per Cent	Number	Per Cent	Number	Per Cent
Birth to 1	329	3	326	302	92.7	0	0.0	24	7.3
1	475	8	467	434	92.9	1	0.2	32	6.2
2	562	4	558	504	90.3	1	0.2	53	9.5
3	563	5	558	486	87.1	0	0.0	72	12.9
4	572	2	570	495	86.8	1	0.2	74	12.7
5	633	3	630	543	86.3	0	0.0	87	13.8
Total	3134	25	3109	2764	88.9	3	0.01	342	11.0

Acute Tuberculosis. *12528. This girl of three months was first examined on December 12, 1934. There was history of exposure and she reacted to tuberculin. A roentgenogram was not made of her chest, because she was not returned to our clinic after the tuberculin test was read. She died of miliary tuberculosis on March 9, 1935.

*14052. This girl of three years was first examined on May 26, 1936. There was history of exposure and she reacted to tuberculin. Enlargement of the hilum shadows was seen on the right side. She died of miliary tuberculosis and tuberculous pneumonia on October 2, 1936.

Chronic Tuberculosis. *9276. This boy of four years was first examined on November 21, 1931. There was history of exposure and he reacted to tuberculin. Disease was present in the base of the right lung. In March 1932 this had decreased somewhat in size and there was evidence of small deposits of calcium in the right hilum region. In September 1932 the disease in the right base had apparently disappeared and in October 1933 there were calcium deposits in this area, as well as in the hilum region. At the time of our last examination in February 1935, there was no change in the lung condition. In February 1935 he was admitted to a sanatorium with pulmonary tuberculosis. Tubercle bacilli were present in the sputum. He died there in November 1939 from pulmonary tuberculosis and congenital heart disease.

13134. This boy of five years was first examined on July 12, 1935. There was history of exposure and he reacted to tuberculin. Both lungs appeared clear at that time and in April 1936. However, in November 1936 there was evidence of a calcium deposit in the right lung at the level of the second interspace, anteriorly. The lung condition had not changed in February 1937, but in August 1937, while in a summer camp, he was found to have disease involving both lungs. He was admitted to a sanatorium the same month, where bilateral artificial pneumothorax was instituted. He is still in an institution.

Extrathoracic tuberculosis was present in 4 cases, as follows:

13851. This boy of nine months was first examined on April 14, 1936. There was history of exposure and he reacted to tuberculin. His lungs appeared clear. In March 1939 there was evidence of calcium deposits in the left hilum region. He was sent to a sanatorium in

TABLE VI
Results of Examinations
Non-Reactors to Tuberculin Throughout Period of Observation
Group II

Age in Years	Total Number	No X-ray	Children Considered	X-ray Negative	Pleurisy	Non-tuberculous Pulmonary Disease	Diagnosis Undetermined	Calcification
1	423	387	36	30	0	3	0	3
2	488	449	39	36	0	3	0	0
3	474	431	43	40	1	1	0	1
4	486	432	54	46	0	3	0	5
5	531	452	79	73	2	2	1	1
Total	2691	2406	285	259	3	12	1	10

August 1939 with a diagnosis of tuberculosis of the right hip joint. He is still in the institution and is being treated by bed rest, heliotherapy, and plaster cast. In July 1941 there was no change in the lung condition.

*15146. This girl of two years was first examined on March 25, 1937. There was no history of exposure but she reacted to tuberculin. An area of disease was found extending into the lung parenchyma from the hilum region on the right side. In August 1937, this had decreased in size but tuberculosis had developed in the *left hip joint*. She was admitted to a hospital in September 1937, where she died in November 1937, from tuberculous meningitis.

*17405. This girl of two years was first examined on August 3, 1939. There was history of exposure, but the family refused the tuberculin test. No evidence of disease was found in either lung. In May 1940 she was admitted to a hospital and at this time she reacted to tuberculin. On June 2, 1940 she was admitted to another hospital where she died from tuberculous meningitis on June 12, 1940. Tubercle bacilli were recovered from the spinal fluid.

16553. This girl of five years was first examined on September 2, 1938. There was no history of exposure, but she reacted to tuberculin. Approximately two years before, tuberculosis had been found in her *left knee*. Tubercle bacilli were recovered from aspirated fluid. The family refused the recommended surgery. Her lungs appeared clear in September 1938. She was last seen by a private orthopedist in December 1940, when surgery was again recommended.

The follow-up experience of the 335 children amounts to 1222 person life years.

CHANGED FROM NON-REACTORS TO REACTORS

Among the 73 children who became reactors to tuberculin while under our observation, only 2 did not have x-ray film inspections of their chests (Table VIII). Of the remaining 71, the *x-ray films were clear* in 38. Only one presented evidence of *pleurisy*; one had *non-tuberculous pulmonary disease*; and in one the *diagnosis was not determined*. Evidence of *calcium deposits* appeared in 19 of these children with no other findings. The *first infection type of tuberculosis was observed in the pneumonic stage* in 9, who were apparently well.

TABLE VII
Results of Examinations
Tuberculin Reactors on First Examination
Group II

Age in Years	Total Number	No X-ray	Children Considered	X-ray Negative	Pleurisy	Non-tuberculous Pulmonary Disease	Diagnosis Undetermined	Calcification	First Infection Type of Tuberculosis Pneumonic Stage	Reinfection Type of Pulmonary Tuberculosis on First Examination	Reinfection Type of Pulmonary Tuberculosis Developed Subsequently	Extrathoracic Tuberculosis (Reinfection Type)
Birth to 1	24	1	23	7	1	0	0	4	8	1	1	1
1	32	0	32	15	0	0	1	3	11 ¹	1	0	1
2	53	1	52	22	1	1	1	11	14	0	1	1
3	72	1	71	44	1	0	0	16	10	0	0	0
4	74	1	73	38	0	0	1	26	7	0	1	0
5	87	3	84	46	1	1	3	27	4	0	1	1
Total	342	7	335	172	4	2	6	87	54	2	4	4

TABLE VIII
Results of Examinations
Non-Reactors Who Later Became Reactors to Tuberculin
Group II

Age in Years	Total Number	No X-ray	Children Considered	X-ray Negative	Pleurisy	Non-tuberculous Pulmonary Disease	Diagnosis Undetermined	Calcification	First Infection Type of Tuberculosis Pneumonic Stage	Reinfection Type of Pulmonary Tuberculosis	Extrathoracic Tuberculosis (Reinfection Type)
Birth to 1	13	0	13	7	0	0	0	2	3	1	0
1	11	1	10	5	0	0	0	3	1	0	1
2	16	1	15	7	0	1	0	4	3	0	0
3	12	0	12	7	0	0	1	3	1	0	0
4	9	0	9	7	0	0	0	2	0	0	0
5	12	0	12	5	1	0	0	5	1	0	0
Total	73	2	71	38	1	1	1	19	9	1	1

The reinfection type of pulmonary tuberculosis developed in only one case, as follows:

*17395. This boy of three months was first examined on July 25, 1939. There was history of exposure but he did not react to tuberculin. X-ray film inspection of his chest was not made. On January 5, 1940 he reacted to tuberculin, and evidence of disease was found involving the greater part of the right lung. He was admitted to a hospital, where he died of tuberculous pneumonia on January 21, 1940.

Extrathoracic tuberculosis developed in only one case, as follows:

16081. This girl of one year was first examined on March 18, 1938. There was history of exposure but she did not react to tuberculin. In June 1939 she reacted to tuberculin, but no evidence of disease was seen in either lung. In May 1940 she was admitted to a sanatorium with a diagnosis of tuberculosis of the twelfth dorsal and first and second lumbar vertebrae. She is still in the institution.

Discussion and Conclusions

FIRST INFECTION TYPE OF TUBERCULOSIS

The tuberculosis literature abounds with articles on the effect of tuberculosis in the first few years of human life. In the earlier literature almost no cases were presented except those of a clinical nature. This is probably because only ill children were examined by physicians.

They usually had severe symptoms and were found to be suffering from acute forms of the disease, such as meningitis, pneumonia, and generalized miliary tuberculosis. In most of these children nothing was known about the antecedent tuberculous developments in their bodies. The first manifestations of the disease were the symptoms of serious illness and, therefore, these highly fatal forms of acute tuberculosis were considered primary. It was thought that such children had recently had massive infections and that the organisms were located at once in the parts involved, where they set up fatal primary tuberculosis. This explanation seemed logical in the light of the information at hand; the error was not detected until the physician's armamentarium was adequate and opportunities existed for actually studying the evolution of tuberculosis in the human body. It was then learned that when tubercle bacilli first enter, they are ingested by neutrophils, which become focalized in various locations and that wherever a neutrophil containing bacilli is lodged, tubercle formation is likely to occur. This is truly the beginning of primary tuberculosis. As the primary lesions develop in various parts of the body, some tubercle bacilli are usually carried to the regional lymph nodes, where they are retained and result in lesions within these nodes. The primary lesion from which the tubercle bacilli escape and the lesions which result in the regional lymph nodes constitute the primary tuberculosis complex.

TABLE IX
SUMMARY OF RESULTS OF EXAMINATIONS
Tuberculin Reactors on First Examination

	Total Number	No X-ray	Children Considered	X-ray Negative	Pleurisy	Non-tuberculous Pulmonary Disease	Diagnosis Undetermined	Calcification	First Infection Type of Tuberculosis Pneumonic Stage	Reinfection Type of Pulmonary Tuberculosis on First Examination	Reinfection Type of Pulmonary Tuberculosis Developed Subsequently	Extra-thoracic Tuberculosis (Reinfection Type)
Group I (First 10 years)	489	11	478	229	19	4	6	150	48	0	10	12
Group II (Second 10 years)	342	7	335	172	4	2	6	87	54	2	4	4
Total	831	18	813	401	23	6	12	237	102	2	14	16

Non-Reactors to Tuberculin Throughout Our Period of Observation

	Total Number	No X-ray	Children Considered	X-ray Negative	Pleurisy	Non-tuberculous Pulmonary Disease	Diagnosis Undetermined	Calcification	First Infection Type of Tuberculosis Pneumonic Stage	Reinfection Type of Pulmonary Tuberculosis on First Examination	Reinfection Type of Pulmonary Tuberculosis Developed Subsequently	Extra-thoracic Tuberculosis (Reinfection Type)
Group I (First 10 years)	1555	167	1388	1355	13	15	0	5	0	0	1	0
Group II (Second 10 years)	2691	2406	285	259	3	12	1	10	0	0	0	0
Total	4246	2573	1673	1614	16	27	1	15	0	0	1	0

When primary tuberculosis complexes begin their development, the tissues of the body are not allergic to tuberculo-protein and, therefore, the reaction of the tissues where the lesions are developing is non-specific. Indeed, the early reactions of the tissues do not differ from those produced by other foreign material, even inanimate objects of the particulate type, such as silica. The defense mechanism of the body against any such foreign material is so prompt and effective in its action that the framework of the tubercles is laid down before the tissues become sensitized and, thus, the amount of destruction caused by the primary foci is extremely small.

Within approximately three to seven weeks after tubercle formation begins, the tissues nearly always become highly sensitized to tuberculo-protein, but this is too late to affect the primary tubercles in a significant manner. The walling-off process is already so well along that tuberculo-protein comes in contact with so little allergic tissue as to be relatively unimportant.

Diagnosis. The symptoms present during the development of the primary tuberculosis complexes are so slight or entirely absent, that physicians are almost never consulted and, therefore, the disease is not known to exist except when apparently normal children are examined for such reasons as exposure to contagious cases of tuberculosis, and surveys. In our experience, the primary or first infection type of tuberculosis, per se, has not caused significant illness, and almost never has our attention been called to it because of symptoms.

Usually the physical examination yields no abnormal findings. Primary lesions may be located in the brain, spleen, kidneys, and many other parts which do not lend themselves to any phase of examination for such small lesions. Many others are in the chest but are so located or are of such small size that they cannot be revealed by

x-ray film inspection. Therefore, in the majority of children from birth through five years of age, the location of the primary complexes cannot be determined during life by our present methods of examination.

It is only by the tuberculin test that the physician can, with a high degree of accuracy, detect the presence of the first infection type of tuberculosis in the bodies of children. In this age group the test is well nigh infallible. It fails only (1) during the pre-allergic stage; that is, the first three to seven weeks after infection occurs, (2) when acute reinfection forms of disease, such as meningitis, overwhelm the body and desensitize the tissues, (3) when a poor quality of tuberculin is used, and (4) when the test is not properly administered. With these exceptions, when a child fails to react to tuberculin, the physician can state with a high degree of accuracy, that tuberculosis does not exist. On the other hand, when a characteristic tuberculin reaction is present, one or more primary tuberculous complexes are surely present in the body, and one must not be misled by negative findings from other phases of the examination including x-ray inspection.

The tuberculin test provides our best criterion concerning the tuberculosis problem in a community. It gives one a good idea as to the presence of contagious cases responsible for the reactors and also ferrets out the potential cases of clinical tuberculosis. Moreover, when the tuberculin test is administered in the same community over a period of years or decades, one may determine with considerable accuracy the success of the work directed against the disease. For example, in Group I, the first ten years of our observation, 489 (20.7 per cent) of the children reacted to tuberculin. There was an additional 197 (8.3 per cent) who were questionable reactors, making a total of 29 per cent. In Group II, the second

ten years of our observation, there were 342 (11 per cent) who reacted to tuberculin and only 3 (0.01 per cent) who reacted questionably, making a total of 11.01 per cent. Thus, there was a marked reduction in the percentage of tuberculin reactors in the second ten years of our studies.

It is interesting to note that from November 1, 1940, to November 1, 1941, that is, the last year of the second period of observation, 239 children from birth to five years of age, inclusive, were examined in our clinic and only 12 (5.04 per cent) reacted to tuberculin. Thus, it is obvious that the incidence of tuberculous infection is decreasing at a rapid rate in this community. Indeed, in the general population the infection attack rate was recently found by Stewart and others to be approximately 1 per cent per year. Probably the main reason that the incidence of reactors is higher in some of our groups is that a considerable percentage of the children examined in our clinic have questionable or definite histories of exposure; this constitutes the chief reason for their examination.

Among our 831 children who reacted to the tuberculin test on first examination, there were 18 who did not have x-ray films of their chests and other phases of the examination. In 401 (49.32 per cent) of the remaining 813, no lesions of any kind were located during our period of observation (Table IX). From postmortem studies by other workers, however, we are convinced that primary tuberculosis complexes exist in the bodies of all of these 813 children.

In some children, parts of primary complexes may be located by the finding of evidence of deposits of calcium in the lung parenchyma, the hilum region, the cervical region, or the abdomen. However, when evidence of calcium deposits is found by x-ray film inspection, one must be guarded in making interpretations, since there are many causes of calcification other than tuberculosis. Indeed, postmortem examinations of adults have revealed that 25 per cent of such deposits are not caused by tuberculosis. Among the 813 tuberculin reactors reported in this paper, 237 (29.15 per cent) were found to have evidence of calcium deposits at some time during our period of observation (Table IX).

In a still smaller percentage, about the time the tissues become allergic, one or more dense homogeneous shadows may be found on x-ray film inspection. These may be located in any part of the lungs and they vary in size from those which can barely be visualized to those which involve large areas, even one-half or more of a lung field. The shadows do not differ from those of ordinary acute pneumonia and other pulmonary diseases which cast dense, homogeneous shadows. However, when due to primary tuberculous lesions, they usually persist for many months with little or no change, after which they gradually disappear, and at some subsequent time there may or may not be found one or more sharply outlined densities in these sites thought to represent deposits of calcium. Many names have been given to these areas, such as epituberculosis, but more recently they have been designated as primary tuberculous foci in the pneumonic stage. This term is not applicable to all of them, since bronchoscopic

observations have revealed that some are due to areas of pulmonary atelectasis resulting from obstruction of bronchial ramifications by enlarged lymph nodes. In such cases, one would not expect to find calcium deposited later at the site of the previous area of atelectasis. In others, the dense homogeneous shadows are cast by one or more primary lesions, around which there has developed collateral inflammation. Tubercle bacilli have actually been recovered from such lesions by aspirating material from them with a needle. Among our 813 tuberculin reactors, 102 (12.54 per cent) presented evidence of first infection type of tuberculosis in the pneumonic stage (Table IX).

Occasionally, primary complexes are located near the surface of the body, in such parts as the skin and the tonsils, where they can be visualized and the involved regional lymph nodes can be studied.

Contagion. There is almost no evidence to prove that the first infection type of tuberculosis, even in the pneumonic stage, is contagious to others; cough and expectoration are usually absent. However, tubercle bacilli may be recovered from the gastric contents in as many as 25 per cent of those who have the disease in the pneumonic stage, and occasionally in the child with only calcium deposits in the lungs for even with no evidence of pulmonary disease. Some of them probably reach the stomach through the trachea, pharynx, and esophagus, and others through the biliary tract and the duodenum. In those children whose tubercle bacilli emanate from primary pulmonary lesions, it is obvious that in the event of a severe cold or bronchitis, resulting in cough or expectoration, bacilli might temporarily be present in the sputum; therefore, precautions should be taken on such occasions.

Treatment. We have not found that any kind of treatment influences the course of this disease. No matter how little or how much is done for children, even when the disease is in the pneumonic stage, it comes under control in the same manner.

Although this type of tuberculosis is extremely benign and, of itself, is harmless, it sets the stage in two ways for every form of clinical tuberculosis to which the human body is heir. First, it changes the tissues from a state in which tuberculo-protein is harmless to one in which it becomes a deadly poison. This changed condition is spoken of as sensitivity or allergy. It is this which is responsible for specific reactions whenever and wherever tubercle bacilli are lodged in such tissues, regardless of whether the reinfection is from endogenous or exogenous sources. Second, lesions of the primary complex may harbor tubercle bacilli over long periods of time and later release them, so they become implanted on allergic tissues, where clinical tuberculosis from its mildest to its most severe form may develop.

Despite the fact that the young child who has only the first infection type of tuberculosis requires no treatment for this disease, it is of extreme importance that subsequent exposure to persons with contagious tuberculosis be avoided, since long ago it was proved that exogenous reinfections may occur. Moreover, all such children should

be examined periodically for reinfection forms of tuberculosis. It is among the tuberculin reactors that deforming and crippling disease develops in the bones and joints and that other extrathoracic forms of tuberculosis occur.

Although the reason is not known, it is a well-established fact that the reinfection type of chronic pulmonary tuberculosis develops with great rarity in the chests of reactors prior to the age of twelve years. However, at this time and thereafter, this type of pulmonary tuberculosis begins to make its appearance and it increases in prevalence with the subsequent decades of life. The parents of all young children who react to tuberculin should be appraised of this fact so that they can act accordingly. Moreover, all young children who react to tuberculin should be reported to the Health Department, where action may be taken with reference to examinations at the proper time, in the event that parents and others fail to carry out this procedure.

Prognosis. As far as the primary type of tuberculosis, per se, is concerned, the prognosis is excellent. In more than twenty years of observation of children, we have not seen one die of this type of disease. However, when primary tuberculosis is present in a human body, it provides all the necessary requirements for reinfection clinical types of disease.

REINFECTION TYPE OF TUBERCULOSIS

If, for any reason, tubercle bacilli are liberated from the lesions of a primary tuberculous complex or reach the body through exogenous sources any time after allergy is established they are met with specific reactions on the part of the tissues. These reactions are intense, since tuberculo-protein is now a deadly poison to cells and tissues because of their allergic state. For example, if a primary tubercle is located in or adjacent to the central nervous system and ruptures into a ventricle or the sub-arachnoid space, where it discharges large numbers of tubercle bacilli, specific reactions occur around the bacilli and the individual promptly develops diffuse tuberculous meningitis. If a lesion of the primary complex ruptures into a blood vessel or a large lymphatic duct and discharges numerous bacilli into the blood stream, they are met with a specific reaction on the part of the tissues wherever they lodge and generalized miliary tuberculosis results. Again, if a lesion of a primary complex ruptures into a bronchus or one of its ramifications and discharges large numbers of tubercle bacilli into the lumen, many of them are likely to be aspirated into the more distal ramifications, where the tissues react in a specific manner and tuberculous pneumonia results. Tuberculo-protein is now so poisonous to the tissues that it often causes necrosis of areas of lung tissue which, when evacuated, leave pulmonary cavities.

The three acute forms mentioned—meningitis, generalized miliary disease, and pneumonia—are reinfection forms of tuberculosis from endogenous sources. They cannot possibly develop except on allergic tissues and in nature the allergic state is usually produced by primary tuberculosis. The earlier writers misinterpreted these conditions as representing primary tuberculosis, because they did not know all that had transpired in each individual's

body before these truly reinfection types of disease could develop. To the acute forms of tuberculosis already mentioned must be added plurisy, pericarditis, peritonitis, and synovial membrane involvement.

In the city of Minneapolis there has been a marked decrease in mortality from acute forms of tuberculosis among children from birth to five years of age since 1921. For example, from 1921 to 1926, the total number of fatal cases of tuberculous pneumonia, miliary tuberculosis, and tuberculous meningitis reported to the Health Department was eighty-four; from 1927 to 1931, thirty-eight; from 1932 to 1936, thirty-three; and from 1937 to 1941, twenty-two. This reduced mortality probably is largely due to the good epidemiology that has been practiced, the isolation and treatment of contagious cases, the prevention of tuberculosis becoming contagious through early treatment of adults, and the protection of children against the bovine type of tubercle bacilli. Thus, the number of young children who become infected with tubercle bacilli has been markedly reduced which, in turn, provides only a small number of potential cases of acute fatal forms of tuberculosis.

Among the 813 reactors to tuberculin reported in this paper, 2 developed fatal tuberculous pneumonia; 4, tuberculous meningitis; and 5, generalized miliary tuberculosis. Thus, of the total number, only 1.35 per cent died from acute forms of tuberculosis. There were 9 other children who developed clinical tuberculosis of the bones and joints; one developed tuberculosis of the adenoids, and another of the cervical lymph nodes. However, there were no deaths in this group of 11. This represents 1.35 per cent of the total number, making 2.70 per cent who developed significant clinical lesions early in life.

Among the 813 children found to be infected at the time of our first examination, there was not one who then had the reinfection type of chronic pulmonary tuberculosis. However, there were 9 who subsequently developed this type of disease, as follows:

<i>Record No.</i>	<i>Reacted</i>	<i>Had Pulmonary Tuberculosis</i>
1399	age 2 years (1923)	age 17 years (1938)
912	age 2 years (1923)	age 18 years (1939)
4973	age 2 years (1927)	age 16 years (1941)
3220	age 3 years (1925)	age 18 years (1940)
6494	age 3 years (1929)	age 9 years (1935)
5447	age 4 years (1928)	age 15 years (1939)
9276	age 4 years (1931)	age 8 years (1935)
5240	age 5 years (1928)	age 16 years (1939)
6811	age 5 years (1929)	age 14 years (1938)

Here, one sees that the interval between the development of the primary tuberculosis complex and the appearance of chronic pulmonary disease usually consists of a good many years. However, this represents only a brief period when one considers the long time through which tuberculosis may evolve in the human body. We are firmly convinced that a number of our tuberculin reactors who are now well will subsequently develop clinical forms of the disease. Therefore, the entire tuberculosis picture

cannot be presented until these children have been observed throughout the span of life.

Among the children who did not react to tuberculin on our first examination, we have seen 198 who were found subsequently to be reactors. Three of these children died from acute forms of tuberculosis early in life; one, from tuberculous pneumonia and two, from tuberculous meningitis. Two other children developed tuberculosis of the bone and joints, and three others, chronic pulmonary tuberculosis. Thus, in this group of 198, eight children (4.04 per cent) developed clinical tuberculosis, three of whom had acute fatal forms and five had chronic disease.

Among the 1673 children who remained non-reactors to tuberculin throughout our period of observation, there was not a single case who was found to have clinical tuberculosis in any form (Table IX). One child (3431) who was a non-reactor on our records, later died of tuberculous meningitis in another institution but, unfortunately, the tuberculin test was not repeated. We believe this child either became infected after we saw her or was infected at the time but her tissues had not yet become allergic. Among these 1673 non-reactors, evidence of calcium deposits was found in the chests of 15, but the first infection type of disease in the pneumonic stage was not found in a single child (Table IX).

Abdominal Pregnancy* *Case Report*

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Devil's Lake, North Dakota

Mrs. Elmer E., aged 52, was admitted to the hospital at 10 a. m. on May 3, 1940. The previous day she had returned from a trip. She had felt quite well all day on the train until after having her evening meal, when she became nauseated. This she attributed to some fish she had eaten, which she thought was tainted. When she left the train, she was driven to her home in the country some 35 miles away. During the drive she had continued nausea and some general abdominal distress. Just before arriving home she experienced a sudden quite severe lower abdominal pain. This was promptly followed by vomiting and an incontinent profuse watery defecation. By the time the patient was put to bed she had become very weak, was vomiting incessantly, and had had several more watery stools. Her relatives called the nearest physician, who was in a town some 15 miles away. He saw her at 1 a. m., about five hours after the onset of her illness. He found her to be in moderate shock with no particular pain but with a very marked abdominal distention. Morphine and caffeine were given subcutaneously and the usual supportive treatment for shock was instigated. As soon as her condition permitted, she was brought to the hospital by car. When seen, following admission, she was still in mild shock, as evidenced by a pulse of 104, temperature 97.8 F., and a blood pressure of 112 over 74-70. Blood examination revealed a moderate secondary anemia; r.b.c. of 3,750,000; hemoglobin, 70 per cent; and a w.b.c. of 11,000. A catheterized specimen of urine was negative. The most noticeable feature on examination was a markedly swollen and distended abdomen, tympanitic throughout, without any definite masses palpable or areas of localized tenderness elicited.

Treatment on admission was primarily to combat the shock still present. External heat, cardiac stimulants, and glucose by phlebotomy were given, and when her general condition improved, physostigmine and enemas were started. Within three hours, the distention was almost entirely gone, and she had had numerous large

liquid stools containing large amounts of foul smelling undigested food particles. Twelve hours after admission, she felt very much improved. There was no pain, no vomiting, her pulse had dropped to 84, and her temperature was 99.

The next morning the following history was elicited: the patient was the mother of 4 children, the youngest 17 years of age. She had evidently passed the menopause as she had not menstruated nor had any irregular vaginal bleeding for over eight years. She had never been sick or undergone surgery and this was her first experience as a hospital inmate. In January, 1940, about four and one-half months prior to her present illness, she had had a somewhat similar, though much milder, attack. This came on shortly after a heavy, rich meal at a church social. At that time she experienced moderate abdominal pain, sudden in onset, which was followed by vomiting, distention and diarrhea. All these symptoms subsided within an hour or two. However, following this bout, she noticed for the first time an irregular, but fairly frequent, lower abdominal distress, which after a few weeks prompted her to consult her physician. Following examination, she was told that her uterus was markedly tipped, which could be, and probably was, the cause of her symptoms. Palliative measures were to be tried and surgery was to be considered if there was no definite improvement following a period of weeks. Her condition, however, gradually improved, except that she was still aware at times of lower abdominal discontent and also noticed occasional days in which she had considerable "bloating" and a tendency to diarrhea.

Pelvic examination disclosed a relaxed perineum and a lacerated cervix. The left adnexa were apparently normal. On the right side, however, examination disclosed a moderately soft mass apparently attached to the posterior wall of the uterus and extending almost to the side wall of the pelvis. The mass was not freely movable and was only slightly tender. There was no tissue turgor suggestive of so-called "frozen pelvis," and as the fundus was clearly palpable above the mass, a very tentative diagnosis was made at this time of a fibromata on the

*Read before the annual meeting of the North Dakota Society of Obstetrics and Gynecology, October 16, 1943, Devil's Lake, North Dakota.

posterior wall of the uterus. From the patient's symptoms it was believed that either hemorrhage was occurring into the tumor mass or that it was undergoing a fairly rapid degenerative process. Her condition markedly improved during the next forty-eight hours. At this time it was decided to have her stay with relatives for a week or so, correct her anemia, improve her condition generally, and then by surgery deal with her pelvic pathology. However, on the fourth day following her admission, the day prior to her expected discharge from the hospital, she suddenly experienced a return of her agonizing abdominal pain, her abdomen again became markedly distended, she started to vomit, and went rapidly into profound shock. She was seen within a few minutes after the onset of this attack, and it was observed that her actions and appearance strongly suggested some form of internal bleeding. This was verified by blood examination which showed a marked anemia, the red cell count being 2,000,000 and the hemoglobin 45 per cent. Shock treatment was instituted, a donor was obtained and in an hour the patient was given 600 cc. of citrated blood by indirect transfusion and was taken to the operating room. Tentative preoperative diagnosis was at this time: (1) hemorrhage into uterine fibromata; (2) possible ruptured ectopic pregnancy; (3) hemorrhage into ovarian cyst.

On opening the peritoneal cavity, free intra-abdominal blood was found, and when the pelvis and its contents were exposed, the first thing seen was a fetus of approximately four and one-half to five months' development lying free in the pouch of Douglas. Later examination of the fetus showed its weight to be 160 Gm. and its length to be 20 cm. Practically no remains of an amniotic sac could be seen, but the placenta with intact umbilical cord was attached to the entire upper two-thirds of the posterior wall of the right broad ligament and the posterior aspect of the right ovary. The placenta had separated from its upper attachment to the right Fallopian tube and that was quite definitely the site of the hemorrhage that gave rise to the patient's condition.

No longer was the diagnosis purely tentative, for now definitely we were dealing with an abdominal pregnancy. Quite fortunately, the placenta was nowhere attached to the uterus, intestines, or omentum, and the condition was dealt with fairly easily and quickly by removing fetus, placenta and right tube, broad ligament and ovary en masse. Blood clots were removed from the pelvis and usual closure done without drainage. Eight hours postoperatively a second blood transfusion of 400 cc. of citrated blood was given.

As might be expected, the immediate postoperative period was rather stormy, not only because of a return of the abdominal distention but also because of the development of a pneumonic process that caused severe cough and high fever. However, oxygen inhalations, Wangenstein suction, and phlebotomy were followed in a few days by marked improvement, and the patient was discharged from the hospital on the fifteenth postoperative day. Since then her general health has been excellent.

Abdominal pregnancy is divided for descriptive purposes into two main types. First, the smaller, extremely rare group of primary abdominal pregnancies in which

the ovum is lying in the abdominal cavity when it becomes fertilized. Fertilization is followed by attachment usually to the omentum or the posterior wall of the broad ligament. The much larger group is termed secondary abdominal pregnancies. These cases usually have their onset following the rupturing of an ectopic pregnancy without death of the embryo. This secondary type can also develop from a tubal pregnancy that does not rupture. Instead, the wall of the tube becomes tremendously thinned out but remains intact and pedunculated and forms an additional layer to the amniotic sac. Such a pregnancy may develop down and between the folds of the broad ligament, or may protrude directly into the abdominal cavity and become adherent to the omentum and intestines. In any case the development of the embryo goes on, unless the sac ruptures prematurely. Such a rupture may occur at any time, leading to death of the embryo and ensuing maceration. If infection develops, pus formation is followed by development of fistulae and the discharge of the products of conception, usually into the bladder or rectum, less often into the vagina or anteriorly through the abdominal wall. Infrequently, following death of the embryo, a process of mummification plus calcification takes place in the dead fetus, resulting in the formation of a lithopedion which may remain in situ for the balance of the patient's life. One such case has been reported in a 94-year-old woman, the lithopedion being the result of an abdominal pregnancy which apparently occurred some sixty years previously. In these cases of abdominal pregnancy, if the sac doesn't rupture or the placenta separate, the pregnancy will continue to term. At term, spurious labor develops, followed by early death of the fetus due to placental separation. During this spurious labor, there is a varying amount of vaginal bleeding and the expulsion of a uterine decidua.

Treatment of these cases at term is early recognition and immediate surgical intervention. The fetus is removed, but the placenta and amniotic sac, in most cases, have to be left in the abdomen because of the difficulty entailed in trying to separate them from their attachments to intestines, omentum, etc. As might be expected, the fetal mortality is just about 100 per cent and the maternal mortality but little less. In the case just reported, undoubtedly the chain of events was as follows: The patient had an ectopic pregnancy which ruptured in January at the time of her first bout of pain. At the time of the rupture, apparently the placental site was not involved and the still viable embryo dropped into the abdominal cavity and continued its development there for the next four and one-half months until separation of the placenta and/or rupturing of the sac caused hemorrhage and the surgical emergency.

In conclusion, not only is abdominal pregnancy extremely rare but also, in the case reported, this unusual condition occurred in a 52-year-old woman who had not been pregnant for seventeen years. Another unusual feature was the marked degree of the apparent effect produced by the abdominal pregnancy upon the intestinal tract as evidenced by the intermittent diarrhea and distention over a period of months and the very marked exaggeration of these symptoms at the time of crises.

The Treatment of Eye Diseases by the General Practitioner

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IT has always fallen to the lot of the general practitioner in small or isolated communities to treat diseases of the eyes, whether it is to his liking or not. But during emergencies such as we are experiencing at present when many physicians, including ophthalmologists, are absent in the service of their country and when those who remain at home are having difficulty in doing all that they are called upon to do, more and more often the general practitioner is forced to do what he can to alleviate trouble in the specialties. Therefore, it is important that the general practitioner endeavor to adjust himself to this situation and become as proficient as possible in the handling of diseases which might ordinarily be referred to someone else. I will call to your attention a few diseases of the eyes with which you may be confronted, and try to describe briefly some points in the diagnosis and treatment which may be of help.

When a patient is brought in with an inflamed eye, it is not always a simple matter for anyone to make a positive diagnosis, for often the history is vague, the symptoms are not typical of any one condition, and the findings on inspection may leave us in a quandary. It is a well known fact that acute conjunctivitis, acute iritis, and inflammatory glaucoma have frequently been mistaken one for the other, so much so that we often give the students in their examination papers the classical question: "Outline the differential diagnosis of acute conjunctivitis, acute iritis, and acute glaucoma." It is important that we try to make a diagnosis carefully because we all know how essential it is to use atropine early in iritis to dilate the pupil and break up posterior synechia, but how disastrous it would be to instill atropine into a glaucomatous eye. Sometimes when glaucoma is ruled out, we dilate the pupil to differentiate an obscure case of conjunctivitis from iritis. Occasionally both of these conditions exist at the same time. We must also bear in mind that there may be an episcleritis or phlyctenular conjunctivitis or inflammation due to irritants. These possibilities must be considered.

To treat conjunctivitis properly, smears should be made and examined. It is not possible in every case to find a causative organism, but the examination of the smear under the microscope is certainly a very important procedure and can be carried out with very little experience and equipment. As you know, not all cases should be treated alike. Probably the most frequently encountered bacterial conjunctivitis is the pneumococcus conjunctivitis which responds readily to Optochin in 1 per cent solution, or quinine HCL 1 per cent, or metaphen in 1 to 2,500 solution. Occasionally the Morax-Axenfeld diplobacillus is found in the smears, and for this, zinc sulfate gr. τ or gr. π to the ounce is specific.

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Argyrol is one preparation which should almost be eliminated from our list of drugs. Too much harm and very little good come from its continued use. The use of the antiseptics should be continued at less frequent intervals for several days to prevent relapse after the infection has apparently been cured. The importance of having smears made in cases of possible gonococcal conjunctivitis need not be stressed. The treatment in this disease has been radically changed by the development of the sulfonamides. In a recent article, Sweet discusses this treatment and compares the value of these various preparations. He concludes that "Sulfanilamide is less effective than sulfathiazole, sulfapyridine, and sulfadiazine, and its use in the disease should be discontinued." Sulfathiazole is effective, but it may be toxic to the conjunctiva when used locally. There is little to choose between sulfapyridine and sulfadiazine, the latter, however, being the less toxic of the two. The oral administration consists of .3 to .6 gr. per pound of body weight as the initial dose, followed by a daily maintenance dose of about 1 gr. per pound divided into six equal portions, administered every four hours. This daily dose is increased to 3 gr. or 5 gr. when necessary. Local treatment consists of frequent irrigations with boric acid solution or .8 per cent solution of sulfanilamide for twenty-four to forty-eight hours. In Sweet's series, two-thirds of the patients showed negative smears and were considered cured within three days, while the average treatment was less than one week.

Epidemic kerato-conjunctivitis has attracted considerable attention both in this country and in some foreign countries during the past few years. Its earliest symptoms may suggest a bacterial infection. There is often a scratchy sensation, with redness and edema of the conjunctiva of the lids and formation of follicles, followed by congestion of the bulbar conjunctiva, and later the vision may be disturbed by infiltrates into the cornea. The disease runs a course of several weeks to as many months, the prognosis usually being good. There is no specific treatment, merely local symptomatic measures being of value. An unknown virus is suggested as the probable cause.

Trachoma must be differentiated from vernal conjunctivitis and folliculosis. When sulfanilamide was first used to treat trachoma, many reports of brilliant results were to be found, and it was hoped that we would soon have this disease conquered. This was too much to expect; nevertheless, by the administration of the sulfonamides, much benefit has been given to patients suffering with trachoma. Cosgrove and Hundley stated that "of 1,866 patients treated in the Arkansas Trachoma Service, 21.5 per cent were improved; 73 per cent arrested, and 5.5 per cent were not improved. When given in

sufficient doses, all of the sulfanilic acid derivatives were equally effective." It is the general concensus that these drugs are certainly beneficial but that the improvement noted is more likely due to the eradication of superimposed bacterial infections and reduction in severity of the clinical symptoms, rather than in the trachoma itself. The oral administration should be supplemented by local treatment, and the dosage is the same as that given for g. c. conjunctivitis, except that the initial dose need not be so large. "Average of 1.85 mg. per 100 cc. of free sulfanilamide in the blood is required to arrest trachoma," according to Cosgrove.

Every physician with good vision and moderate dexterity should be able to remove foreign bodies from the cornea, but you would be surprised at how many patients come to the oculists second-hand, the foreign body either not found or only partially removed by some other physician. I believe that there are two or three reasons for this state of affairs—insufficient anesthesia, inadequate illumination, and insufficient magnification. A brilliant, sharply focusing light on a stand or bracket is essential, and the physician should wear additional magnifying lenses or a loupe to see properly the tiniest foreign bodies or the rust stains that lie beneath the foreign bodies. With this equipment there ought to be no difficulty. After removal of the foreign body, an antiseptic ointment, such as sulfathiazole 5 per cent, or bichloride of mercury 1 to 3,000 should be applied, and all such eyes should be kept closed with a firmly fitting patch until healed. Fluorescein sodium 1 per cent or 2 per cent solution should be used to discover unhealed lesions or ulcers or abrasions of the corneal epithelium. It is invaluable as an aid to proper diagnosis and treatment, and with it I have found the stained areas much more visible when a red-free filter is used. Tiny scratches or the lesions of a dendritic keratitis might readily be overlooked without the fluorescein.

Ulcers of the cornea are very frequently encountered, some of them following injury by foreign bodies on the cornea. Others follow abrasions from branches of trees, bushes, cardboard, finger nails, or what not. Where infection follows the injury, especially if pneumococci, the ulcers may become rapidly destructive. No doubt you can all recall such disastrous cases. Thorough cauterization of the ulcer with trichloroacetic acid or weak iodine may stop the infection when in its incipency. A fine applicator or sharp pointed toothpick on which a wisp of cotton is tightly wound is excellent for applying these agents and for cleaning out an ulcer.

When the ulcer advances in spite of treatment, do not hesitate to open the anterior chamber at the periphery with a small sharp knife—preferably a cataract knife—or to perform a delimiting keratotomy (Gifford) if the center of the cornea is threatened. The improvement in most cases is nothing short of spectacular. This procedure may need to be repeated. The pupil should be widely dilated, and care must be exercised to avoid injury to the lens.

Burns of the eyeball by acids, alkalis, lime, or tear gas are frequent, and the general practitioner is usually the first physician to see such cases. Prompt efficient treat-

ment for such injuries is most essential. Thorough immediate irrigation is more important in the first treatment than the use of a neutralizing agent. Water or boric acid solution are equally effective. Any remaining foreign particles should be removed, especially in lime burns.

For acid burns, irrigation with water is probably all that is necessary, but 3 per cent bicarbonate of soda may be instilled as a neutralizing agent.

For alkali burns, a 1 per cent acetic acid is instilled freely.

For lime burns, it is recommended that after free irrigation, a fresh 5 or 10 per cent solution of neutral ammonium tartrate be instilled several times a day for a week or two. This is quite irritating and requires a few drops of pontocaine $\frac{1}{2}$ per cent before its use.

Tear gas burns are very destructive and require prompt use of glycerin, or preferably a combination containing .4 Gm. of sodium sulphite dissolved in 25 cc. of water and 75 cc. of glycerin. Unfortunately, the damage is frequently severe before proper treatment is possible.

For mustard gas burns it is best to avoid irrigation with water and to instil olive oil into the eyes, with a free application of an ointment to the lids.

Whenever a young person or a child is seen with a recently developed clouding of the cornea, the first condition to think of is interstitial keratitis. In almost 100 per cent, these cases are due to hereditary syphilis. Contrary to past teachings, it is most important to institute specific treatment as soon as this disease is suspected. The arsenicals, supplemented by mercurials and followed by iodides, are accepted by most authorities as the proper routine. In addition, a course of fever therapy, either by foreign protein injections or by the Kettering-hypertherm, is considered of great value in some cases. It is probable that the involvement of the second eye is occasionally prevented by beginning the treatment early, and in the cases I have seen, I am sure this is true, as well as the fact that the severity of the disease in the involved eye is much reduced.

In cases of acute iritis our first efforts are to dilate the pupil, to put the ciliary body at rest, and to prevent or to break up posterior synechiae. Therefore, atropine 1 per cent is instilled immediately and repeated frequently, supplemented by epinephrine bitartrate 1 per cent ointment, or 10 per cent neosynephrin emulsion. In addition, salicylates in doses totaling 1 gr. per pound of body weight per day are administered for several days, and then reduced to 60 to 90 gr. per day. Ophthalmologists have found intravenous injections of triple typhoid vaccine to be of great value in combating infections of the eye, especially in severe iritis, the dose varying from 10 to 50 million bacteria, depending on the reaction desired, and repeated as necessary. Usually the salicylates are omitted during the reaction period. Sometimes drainage of the cell-filled aqueous by paracentesis is a measure of great value. Naturally foci of infection should be eradicated if possible.

For examination and diagnosis of diseases involving the interior of the eye the ophthalmoscope is essential,

and it is highly important that every practitioner of medicine should use the ophthalmoscope in making a thorough and complete examination of his patient. In many cases pathological lesions which have produced no subjective symptoms will be discovered, and the knowledge of their presence may be of great benefit to the physician in the treatment of the patient. Lesions of the retina, choroid, or optic nerve are, in most cases, merely manifestations of a general disease and even when discovered by the ophthalmologist, they are referred to the internist for treatment.

Finally, a few words should be said concerning vitamins in ophthalmology. In spite of the enormous amount of research, comparatively little is known about vitamins and their relation to diseases of the eye. The only ones which have apparently proved valuable in ophthalmology and which are frequently prescribed, are vitamins A, B₁, B₂, B complex, and vitamin C.

Vitamin A is beneficial in cases of keratomalacia and hemeralopia, xerosis of the cornea and conjunctiva, marginal catarhal corneal ulcerations, and phlyctenulosis. It is given in doses of 25,000 I. U. or more per day. I have seen no proof that it benefits vision in myopia or cures color blindness.

Vitamin B₁, thiamin hydrochloride, is of apparent great value in toxic amblyopia—especially tobacco and alcohol amblyopia. Divided doses totaling 25 mg. per day may be given.

Vitamin B₂ is known to be beneficial in cases of rosacea keratitis. Gifford states that "the most effective treatment of this disease is obtained by intravenous injection of 1 to 2 mg. of riboflavin daily for ten days, followed by daily oral administration of 5 mg., together with fairly large doses of vitamin B complex." It is claimed that corneal lesions, especially with vascular invasion, are benefited by riboflavin, and that symptoms of itching, burning, and roughness of the lids with mild photophobia are relieved.

Vitamin C (ascorbic acid) is given in cases of hemorrhagic retinitis. Lyle and McLean are enthusiastic over the improvement obtained by its use in corneal ulceration, superficial keratitis, and chronic corneal opacities. Treatment consists of daily injections of 500 mg. intravenously until inflammation has ceased, followed by ascorbic acid tablets given orally.

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Walter Reed in Minnesota*

Bertha L. Heilbron†

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IN the early spring of 1892 all was bustle and commotion in the little town of Browns Valley, between Lakes Traverse and Big Stone on the western boundary of Minnesota. The facilities of the village were taxed to their limit as settlers poured in or camped on its outskirts awaiting the opening of the Lake Traverse Reservation. This portion of the Sisseton and Wahpeton Indian Reservation—nearly six hundred thousand acres of fertile prairie land—was located immediately across the Minnesota border in North and South Dakota. Temporarily, Browns Valley was the gateway to a section of the unsettled West.

Under a presidential proclamation, the reservation was scheduled to open on April 15. To prevent eager land seekers from breaking across the line and attempting to stake claims before that date, the United States Army was called upon for aid. On April 1 Browns Valley took

on a military aspect with the arrival of two companies of the Third United States Infantry from Fort Snelling—Company A under Captain John W. Hannay and Company E under Captain Melville C. Wilkinson. A Browns Valley newspaper, in announcing the arrival of the troops, notes that "Surgeon Reed is in charge of the hospital corps, which is fully equipped with ambulance, etc."¹

This cryptic statement proves to be one of the many references in obscure sources to the Minnesota sojourn of Dr. Walter Reed, the distinguished bacteriologist whose name will be forever associated with the conquest of yellow fever. Although his true interests were centered in the laboratory, he helped to guard an unsettled frontier area in the chilly dampness of a Dakota spring. Some idea of the stirring scenes he must have witnessed on that mid-April day of 1892 is reflected in a contemporary newspaper account. It records that long before noon the bluff which marked the reservation line west of Browns Valley was covered with teams and "positions were at a premium." Finally, "at 12 o'clock sharp the guards fired pistols which was the signal to move on," and this was followed by a "grand stampede and rush."

*Dr. Reed having been a contributor to the *Northwestern Lancet*, which was founded in 1881 and which was the direct predecessor of the *Journal-Lancet*, and this being the beginning of the 74th year of publication (starting with *Northwestern Medical and Surgical Journal* to which the *Northwestern Lancet* succeeded), Miss Heilbron's article is reprinted from *Minnesota History*, the quarterly magazine of the Minnesota Historical Society, for September, 1943, by permission.

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That the soldiers were successful in keeping the peace is evident, for on April 16 the United States Indian agent to the Sisseton wrote gratefully to Captain Wilkinson: "All is well that ends well. The Lake Traverse Reservation is now open. For valuable services of your command you have the thanks of the people. I am now convinced that the U. S. Troops are no longer required at this Reservation."²

Reed's participation in the opening of the Sisseton and Wahpeton lands was only one episode in a long period of service as an army surgeon in the frontier West—a period that occupied some sixteen years of his professional life and took him to no less than fifteen western military posts. In June, 1875, six years after receiving his medical degree, the young Virginian was commissioned an assistant surgeon with the rank of first lieutenant in the United States Army. A year later he was sent to Fort Lowell, Arizona. While he was stationed at Fort Robinson, Nebraska, in 1884, he counted among his patients "Old Jules" Sandoz, the hero of a best-selling biography of the past decade. Under army orders Reed moved from frontier post to frontier post, spending his energies in caring for ailing soldiers and settlers alike, for he was stationed chiefly in sparsely settled areas where physicians were available, if at all, only in connection with the military. According to one biographer, it was in frontier garrisons, in surroundings "unfavorable in opportunities for study and intellectual contacts but rich in experiences calling for initiative and ingenuity," that Reed "laid the foundations for his career as a scientist."³

Eventually, however, Reed began to chafe under the routine of army life and to long for wider horizons and the opportunity for further professional study. In 1890, a decade after he was promoted to the rank of captain, he applied for a leave of absence. His request was not granted, but it led to an order to report to Baltimore, where he became attending surgeon and examiner of recruits, with the privilege of continuing his medical studies in Johns Hopkins University. Reed's years of isolation on the frontier had seen the remarkable discoveries of Pasteur and Koch—discoveries that revolutionized the practice of medicine. Guided by Dr. William Welsh, Reed turned with eagerness to the new field, specializing in bacteriology. But the Baltimore opportunity was of short duration. At the close of a year, in October, 1891, he was ordered to Fort Snelling, then a Midwestern post far removed from centers of scientific study. On November 10 he took up his duties in the hospital of the military post.⁴

During the nine months that followed, Reed doubtless resided at the fort, for his son, Major General Walter L. Reed, recalls "going to the High School in St. Paul from Fort Snelling for a short period." The records of Central High School of St. Paul indicate that young Reed was enrolled in 1892 and 1893. In August, 1892, Dr. Reed was transferred to St. Paul, where he served for a year as attending surgeon and examiner of recruits on the staff of the commanding general of the Department of Dakota. The headquarters of this military division, which embraced Minnesota, North Dakota, most of South Dakota, Montana, and Fort Yellowstone, Wyoming, were then located in St. Paul, with offices in a

building at the north end of the Robert Street Bridge. From the scientist's point of view, the St. Paul post had but a slight advantage over that at Fort Snelling, for the "only laboratory equipment provided consisted of a few test tubes." While he was stationed in St. Paul, Reed lived at the Albion, now the Angus Hotel.⁵

It was during his two years of residence in Minnesota, immediately following the stimulation of a year of study in Baltimore, that Reed's scientific talents began to mature and his researches to bear fruit in the form of publications. His first published work, a paper on erysipelas, appeared in the *Boston Medical and Surgical Journal* in 1892. It was closely followed in the spring of 1893 by his "Remarks on the Cholera Spirillum," which was published in a pioneer Minnesota medical journal, the *Northwestern Lancet of St. Paul*.⁶ Reed's second paper reflects a scientific activity of still another type, for it was prepared as an address and was delivered before the Ramsey County Medical Society on March 27, 1893. In view of the fact that Hamburg and northern Germany were suffering from a serious outbreak of Asiatic cholera, the subject was timely, and the local physicians welcomed an opportunity to hear it discussed by a man of growing reputation as a bacteriologist. They appreciated, too, the advantage of seeing the cultures of cholera bacilli with which the speaker illustrated his remarks. Reed probably obtained the cultures from a colleague in the army medical corps, Colonel George Miller Sternberg, who served as consultant on the disinfection of ships reaching the New York quarantine station during the Hamburg epidemic. He has been given credit for the fact that cholera did not spread in the United States, although the disease did reach its shores. On the day immediately following the St. Paul meeting Reed extended to Sternberg by letter his "heartiest thanks for the cultures which arrived in good shape, a few days ago." There can be little doubt that the reference is to the cholera cultures displayed on March 27 before the meeting of Ramsey County doctors in the Ryan Hotel, St. Paul, with Dr. John F. Fulton presiding. The Minnesotans expressed their appreciation at the close of the meeting, when a "vote of thanks was extended to Dr. Reed for his kindness in showing his cultures of cholera bacilli and giving such a clear exposition of the subject."⁷

The meeting had an interesting sequel which was not without importance for the future careers both of Reed and of a member of his audience. Among the fifty-three people who listened to the army surgeon's remarks on Asiatic cholera was a man who had been teaching biology in the St. Paul High School for five years and who was also pursuing his medical studies in the University of Minnesota. He was Louis B. Wilson, who later gained distinction by organizing and developing the laboratories of the Mayo Clinic and by directing the Mayo Foundation. In the course of the evening Dean Perry H. Millard of the university medical school introduced Wilson to Reed, describing the young Minnesotan as "a man who had a laboratory." Dr. Wilson recalls that Reed responded "with what for him was real enthusiasm." The introduction opened up for him an opportunity to work once more in a laboratory and to continue his bacteriological researches, since the St. Paul High School, accord-

ing to Dr. Wilson, could boast of an "unusually good biological laboratory."⁸

Thereafter Reed "made much use of the high school laboratory." With Dr. Wilson's assistance, he "improved fairly effective bacteriological apparatus—mostly from gas ovens and boilers inherited from a discontinued Domestic Science Department!" Working with this crude equipment, Dr. Wilson "learned from Doctor Reed the elements of bacteriology." It was largely as a result of this experience that he was chosen to assist Dr. Frank F. Westbrook when, in 1896, he became bacteriologist and director of the laboratory of the Minnesota state board of health.

Much of the work accomplished by the two scientists in the simple little high school laboratory related to the "diagnosis of diphtheria from cultures made from swabs of patients' throats"—a procedure newly inaugurated by Dr. William H. Park of New York. Dr. Wilson tells the following story about the joint effort: "Doctor Reed and I got from Doctor Park a sample box, holding two test tubes, one containing a sterile swab and the other a solidified serum culture medium. We went into our own pockets,—in which there was very little money!—for funds to have made for us at a local box factory one hundred boxes for diphtheria culture outfits. These we distributed to several physicians in St. Paul asking as a favor that swabs from throats of cases of suspected diphtheria be sent to us." Dr. Wilson believes that the work he and Dr. Reed did on the cultures thus obtained represents the "first attempt at the examination of throat cultures for *Bacillus diphtheriae* west of New York." It is significant that immediately after Reed was transferred to Washington in the autumn of 1893, his interests centered about the study of diphtheria and its treatment. Early in 1894 he was invited to participate in a discussion before the Medical Society of the District of Columbia on the "Prevention and Control of Diphtheria."⁹

Reed's year of military service in St. Paul came to a close on August 31, 1893, after he had received an appointment as curator of the Army Medical Museum and professor of bacteriology in the newly organized Army Medical School in Washington. For the opportunity to devote his energies to science, Reed was indebted to his friend Dr. Sternberg, who was named surgeon general of the United States Army in the spring of 1893. Reed's enthusiastic approval of the choice is reflected in a letter from St. Paul, addressed to Sternberg on May 30, 1893. After congratulating him upon his appointment, Reed continues: "When I think that it places at the head of (medical) corps the one man who preeminently stands forth as the representative of progressive scientific medicine and that it means that the fossil age has passed, I have an irresistible desire to toss my very hat in the air."¹⁰

After removing to Washington, Reed was advanced in military rank to major and surgeon. The nine years that elapsed before his untimely death in 1902 were marked by monumental discoveries leading to the control of typhoid and yellow fever. Today the results of his work in the interest of public health are increasing the efficiency and easing the lot of millions of Americans engaged in tropical warfare. That Reed's two years of service in Minnesota have been almost completely overlooked by his biographers is somewhat surprising, for they were anything but unimportant from the scientific viewpoint.¹¹ With his year of intensive study in Baltimore, they served as an interlude between his frontier experience and his great period of scientific productivity.

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6. Kelly, Walter Reed, 69; M. E. M. Walker, Pioneers of Public Health, 220 (New York, 1930); Northwestern Lancet, 13:161-164 (May 1, 1893). For a list of Reed's published works, see Wood, Doctor in Uniform, 268.
7. The record of the meeting at which Reed spoke is to be found in the Minutes of the Ramsey County Medical Society, now preserved in its library in St. Paul. In the Northwestern Lancet, 13:161, the meeting is dated March 28, 1893; this is doubtless an error. For Reed's letter to Sternberg, see Martha L. Sternberg, George Miller Sternberg: A Biography, 126 (Chicago, 1920). The letter reflects Reed's impatience to devote himself to scientific pursuits. "I should be very glad to give more time to bacteriology," he writes, "but, alas, my dear doctor, when most interested I must stop for practical things, so that I can only do the merest 'dabbling.'" See also James M. Phalen, "George Miller Sternberg," in Dictionary of American Biography, 17:592.
8. Wilson, in Minnesota Academy of Science, Proceedings 4:9; Helen Clapesattle, The Doctors Mayo, 442-444, 643 (Minneapolis, 1941). The name of the St. Paul High School later was changed to Central High School.
9. Wilson, in Minnesota Academy of Science, Proceedings, 4:9, 10; Kelly, Walter Reed, 70. Dr. John M. Armstrong of St. Paul, who attended Central High School in the early 1890's, knew Reed and his son, and can recall the bacteriologist's work in the school laboratory.
10. Sternberg, George Miller Sternberg, 131.
11. Dr. Kelly, in his Walter Reed, 67, passes over this period in Reed's career with the comment that "In October, 1891, Reed was sent to Dakota (sic), and remained there until 1893." Miss Wood devotes part of a chapter to the main outlines of the Minnesota episode. See her Doctor in Uniform, 150-154.

News-Letter of the American Student Health Association

THE SECRETARY'S MAIL

In the *Educational Record* for January, 1944, Dr. J. Howard Beard, Director University of Illinois Health Service, discusses clearly the changing responsibilities of college health services. He concludes that while the immediate effect of the war may necessitate temporary changes in functions of health services, they will continue to render an indispensable service under extraordinarily favorable circumstances. To quote, "The consequences and revelations of a global conflict, the rapid advances of medical knowledge, and an ever-increasing public awareness of the tremendous advantages to be gained by the use of the biological, chemical and physical sciences in the promotion of health and the prevention of disease give college health services unexcelled opportunities to make a major contribution to social progress."

The sending out of annual statements brings in news of changes of personnel not otherwise supplied. Dr. Clarence W. Spears, widely known as a football coach, has taken over directorship of the Department of Health at the University of Maryland.

Dr. Meredith B. Hesdorffer, who went from the University of Minnesota to direct the Students Health Service at the University of Montana, writes that he is now with the United States Public Health service as Chief Medical Officer for the War Production Board.

DIGEST OF MEDICAL NEWS

Staphylococcus Infection Superimposed on Influenza is Dangerous. In the *Lancet* (London) of Dec. 25, 1943, F. Himmelweit reports a fatal case of pneumonia in which Influenza Virus B was apparently the primary infecting agent and *Staphylococcus aureus* the lethal secondary invader. This case serves to emphasize again the statement made by Andrewes, Smith and Stuart-Harris in 1937 that "when *Staphylococcus aureus* is a secondary invader, death is apt to occur more quickly." In fulminating cases of pneumonia the possibility of the symbiotic action of Influenza virus and *Staphylococcus aureus* might well be considered.

Twelve Year Survival with One-half of One Kidney. It has long been known that laboratory animals may survive surgical removal of 75 per cent of their renal parenchyma. McKim, Smith and Rush now report (*Jour. of Urology*, Dec., 1943) that a similar factor of safety exists in the human being. On Aug. 5, 1930, a right heminephrectomy was done on a 38 year old female patient because of calculus pyonephrosis. On April 2, 1931, a left nephrectomy was done for the same cause. This patient survived the birth of her seventh child (in June, 1934), a cholecystectomy for cholelithiasis (in Aug., 1934) and on May 15, 1943, with the exception of a mild hypertension she is "in excellent condition." At this last examination the functional test was 36 per cent; blood urea was 28 mg.; plane x-ray was negative for stone.

Renal Lesions within Draft Age. In order to visualize the problem of renal lesions apt to be found in draftees,

Dr. Clyde L. Deming (*Jour. of Urology*, Dec., 1943) classified all cases of renal lesions occurring among men between the ages of 18 and 38 years in his private practice file.

Among 331 such cases: more than 50 per cent were cases of renal calculus; 12 per cent were cases of recurrence of renal calculi in the same kidney or opposite kidney; renal infections were common with a high percentage of staphylococcal infections; tuberculosis of the kidney occurred in 6 per cent of cases; unexplained hematuria clearing without further evidence of disease were relatively common; renal injury occurred most frequently in the early twenties; nephritic lesions and hypertensive syndromes were relatively uncommon. The actual distribution of cases was as follows:

Calculi (renal and ureteral)	154 cases
Pyelitis and pyelonephritis	43 cases
Hydronephrosis	29 cases
Traumatic lesions	29 cases
Tuberculosis	21 cases
Nephritis	16 cases
Hematuria of undetermined etiology	12 cases
Anomalies	8 cases
Ptosis	6 cases
Phosphaturia	4 cases
Nephrosis	3 cases
Perirenal and perinephritic abscess (1 each)	2 cases
Tumor	1 case
Polycystic kidney	1 case
Albuminuria	1 case

330 cases

Warning Regarding Use of Pulmotor as Resuscitator.

In the Dec. 24, 1943, issue of *Science*, Yandell Henderson warns against the use of so-called "pulmotor-resuscitators" or any form of apparatus designed to induce a return of breathing in cases of partial drowning, electric shock and gas asphyxiation by alternately sucking or blowing. In spite of recent acceptance of suck and blow mechanical devices by the Council on Physical Therapy of the American Medical Association, Prof. Henderson as well as the American Red Cross and a recently appointed National Research Council Committee, disapprove of their use. Prof. Henderson adds his approval to the recommendations of the American Red Cross, i. e., (1) immediate manual prone pressure artificial respiration, and (2) simple inhalators as auxiliary aids.

Sulfonamides in Acute Tonsillitis and Pharyngitis. Gettelman and Kautz (*U. S. Naval Medical Bulletin* of Feb., 1944) report that "in a series of 150 cases of severe acute tonsillitis and pharyngitis treated early with sulfonamides, the average duration of time lost was one-half that of a series of 40 cases which received sulfa treatment late or not at all."

Chemotherapy Ineffective Against Influenza Virus. Using the PR-8 strain of Influenza A Virus and the mouse as the experimental animal the Personnel of Naval

Laboratory Research Unit No. 1 (*Science*, October 15, 1943) report that none of the following compounds, among others, was effective in preventing influenzal infection: 1 mg. of sulfanilamide daily, 1 mg. of sulfathiazole daily, 1 mg. of sulfapyridine daily, 1 mg. of sulfadiazine daily, 2 mg. tryptaflavine daily, 5 mg. (650 Oxford units) of penicillin daily, 5 mg. tyrocidin daily, 5 mg. gramicidin daily, .02 mg. azochloramid daily, .001 mg. neoarsphenamine daily.

New York City Changes its Diphtheria Immunization Policy. The new procedure now recommended by the N. Y. C. Dept. of Health (*Quarterly Bulletin*, Dec., 1943) based upon recommendations of the Subcommittee on Diphtheria Immunization of the Committee on Evaluation of Administrative Practice of the American Public Health Association follows:

1. All children should be immunized beginning at the age of six to nine months and finishing before the first birthday, with either two doses of alum precipitated diphtheria toxoid or three doses of fluid diphtheria toxoid. The intervals between doses in both cases are at least one month. In case the interval between doses is longer than a month, it is not necessary to start the series again.

2. A similar series of primary immunization should be given to any unimmunized child less than 10 years old.

3. As a routine procedure, the performance of the Schick test, three to six months after completion of the inoculations in infants, is not considered essential, although it may be desirable in private practice.

4. A single reinforcing (booster) dose should be given three years after the primary series if the latter is given before the age of seven years. Subsequent booster doses are not essential. Emphasis should be placed on giving the booster dose before school entrance for children whose primary series were administered three or more years previously, unless a Schick test was negative within six months of school entrance. Fluid diphtheria toxoid is the preferred material for the booster dose.

5. Unimmunized children over the age of 10 years and adults exposed to occupational hazards such as work in a communicable disease hospital should receive a preliminary Schick test. If this is negative, further treatment is unnecessary. If the Schick test is positive, a primary series of three doses of fluid diphtheria toxoid may be given, provided a sensitivity test is negative. If the sensitivity test is positive, it may be desirable to give multiple small doses of fluid diphtheria toxoid until a subsequent Schick test is negative.

Change in Status of Antimeningococcic Serum. The Council on Pharmacy and Chemistry of the American Medical Association has recently voted (*J.A.M.A.*, Jan. 8, 1944) to omit Antimeningococcic Serum and Meningococcus Antitoxin from *New and Nonofficial Remedies*. As the result of an inquiry conducted by Dr. Hobart A. Reimann the consensus among physicians in civilian practice and in the armed forces seemed to be that sulfonamide therapy (sulfadiazine) was the method of choice in the treatment of meningococcemia and meningococcic meningitis.

Causes Other Than Iodine Deficiency for Goiter. As early as 1928 Chesney, Clawson and Webster (*Bull. of Johns Hopkins Hosp.*, 1928, XLIII, 261, 278, 291) re-

ported the development of large hyperplastic goiters in rabbits maintained on cabbage diets. In spite of the hyperplasia the animals showed low metabolic rates. Administration of iodine before goiter formation occurred served to prevent occurrence but administration of iodine after the goiter had formed threw the animals promptly into severe thyrotoxicosis.

Other workers have since shown that the leaves of many brassica plants, rape seed, soybean flour, sulfaguanidin, thiocarbamide, methylcyanide, potassium thiocyanate, and various members of the sulfonamide group have a definite goitrogenic action.

Rawson, Hertz, and Means (*Ann. of Inter. Med.*, Dec., 1943) now report 3 cases of goiter developing in persons receiving potassium thiocyanate for treatment of hypertension. The cases are characterized by thyroid hyperplasia, hypothyroid symptoms, exophthalmos (in one case), low basal metabolic rate, low blood iodine, decreased urinary excretion of labeled iodine, increased urinary excretion of thyrotropic hormone in the inactivated form. These workers suggest that this thiocyanate goiter probably can be prevented by prophylactic doses of iodine and that it can be relieved by the use of thyroid extract even when the administration of thiocyanate for the hypertension is continued.

Unusual Epidemic of Infectious Mononucleosis. Infectious mononucleosis commonly occurs sporadically rather than in epidemic form, though under the term of "glandular fever" there have been outbreaks in schools where a large proportion of children exposed have come down with the infection.

A recent epidemic reported by Halcrow, Owen and Rodger (*British Med. Jour.*, October 9, 1943) is unusual in that it involved adults rather than children and produced hematoserologic evidence of infection in so many persons in whom there were no clinical manifestations of the disease.

In an E.M.S. Hospital a woman, aged 25, was admitted on August 5, 1943, with typical infectious mononucleosis. Within the next few days 4 other cases were admitted. The next victim was the first patient's physician. Other members of the hospital staff and many patients in the hospital next came down. A special study of the whole hospital group was then made with the following results: of 296 persons studied, 125 showed clinical evidence of the infection, 165 showed hematoserologic evidence without clinical manifestation. On August 25 the hospital was closed to new patients. Studies of relatives of the hospital staff living outside the hospital and of people living in the vicinity of the hospital revealed numerous instances of latent or mild infection; but of 20 persons living 35 miles from the hospital none showed clinical or hematoserologic evidence of the infection. It would appear that though the form of infectious mononucleosis in this outbreak was mild, it was extraordinarily communicable.

Systemic Allergic Reaction Induced by Yellow Fever Vaccine. Lt. Harry Schwartz, MC, USA, in the November 1943 issue of the *Journal of Lab. & Clin. Med.*, reports a case of severe constitutional reaction immediately following injection of yellow fever vaccine.

He points out that yellow fever vaccine culture medium is closely related to egg white and to chicken meat and suggests that a history of sensitivity to either of these substances in a patient should put the physician on guard and lead him to anticipate a possible constitutional reaction when yellow fever vaccine is given such a patient.

Equine Immunization against Encephalomyelitis. The December, 1943 issue of the *Bull. of U. S. Army Med. Dept.* reports that all horses and mules of the Army are vaccinated annually against equine encephalomyelitis. Since 1940, when the use of this vaccine started, only one case of this disease has occurred among military animals. The vaccine is bivalent, protecting against both the Eastern and Western types of virus; it is administered intracutaneously. The vaccine is prepared by the Army Veterinary School, Army Medical Center, Washington, D. C., through propagation of the virus in developing chick embryos.

Water Filtration to Remove Cysts of Amœbae. Water contaminated with cysts of *Endamœba histolytica* will still contain cysts after filtering through standard sand filters at a high rate and without previous coagulation and settling. The *Bull. of the U. S. Army Med. Dept.* (Dec., 1943) reports that recent tests indicate that with the following precautions sand filtration can be reasonably effective in removing cysts from infected water: (1) the water should be treated with a heavy dose (6 to 10 grains per gallon) of aluminum sulphate or other coagulating agent; (2) at least one hour should be allowed for settling; (3) the filtration rate should be slow (not to exceed 6 gallons per square foot of filter surface per minute); (4) chlorination should be heavy (sufficient to provide a chlorine residual of at least 1 part per million).

Nail Puncture Wounds. McDonnell, Wallace, and Andes in the Dec. 4, 1943 issue of the *J.A.M.A.*, report that among 721 cases of nail puncture wounds treated by them only 43 had secondary infection (six severe enough to lose time) and there were no cases of tetanus and no deaths. The treatment included: (1) cleansing the skin surrounding the wound; (2) trimming the skin edges; (3) probing to the bottom of the wound; (4) irrigation with hydrogen peroxide by injection through a blunt needle attached to a syringe (the needle tip being placed by the bottom of the wound in the direction and at the depth determined by probing); (5) dry sterile dressing; (6) injection of tetanus antitoxin when the punctures were deep or showed gross contamination or when (on the second day) there were signs of infection. Men with severely contaminated wounds were given mixed gas-bacillus antitoxin and tetanus antitoxin. The average loss of time per case for the whole 721 cases was 0.072 days. Of the 8 cases who actually lost time the average loss was 6.5 days each.

Grain Itch. Workers in hay, straw or unthreshed grain have suffered at times from itching, urticarial rash occurring sometime in the first 24 hours after exposure to these materials. George K. Rogers (*J.A.M.A.* or Dec. 4, 1943) reports the occurrence of several such cases and

reminds us that the cause of the malady was discovered by Mr. George Newport of England in 1849 to be a mite similar to the acarus of scabies and known as the *Pediculoides ventricosus*. Since the mite remains attached to the human skin only a short time anyway the treatment does not need to involve the killing of the mite but merely the relief of the itching and burning. This can be accomplished by warm demulcent baths and antipruritic lotions. Prevention of the pest is to be sought through (a) burning of the grain stubble during the fall or spring; (b) control of the grain moth on which the mite apparently lives as an ectoparasite; (c) the dusting of lofts, barns and granaries with powdered sulphur.

Council on Pharmacy and Chemistry of A.M.A. Adopts Metric System. The *Journal of the American Medical Association* (Dec. 4, 1943) announces that the Council on Pharmacy and Chemistry has decided that henceforth in all its publications it will give quantities and dosages exclusively in the metric or centimeter-gram-second system. Conversion tables will, of course, be provided in each volume.

Postwar Implications of Fluorine and Dental Health. At the recent convention of the American Public Health Association in New York City the following points were made with regard to the possible use of fluoride in drinking water:

(1) H. Trendley Dean, D.D.S., dental surgeon, U.S.P.H.S., stated that school children who used domestic waters containing as little as 1 p.p.m. of fluoride experience only about one-third to one-half as much dental caries as do comparable groups using water which is free of fluoride.

(2) Raymond J. Faust, a waterworks engineer of the Michigan State Department of Health, stated that application of sodium fluoride to water supplies deficient in fluoride would be both cheap and easy, using chemical feeding equipment of types already in use.

(3) John W. Knutson, D.D.S., dental surgeon, U.S.P.H.S., stated that adding fluoride to drinking water would hold promise of caries prophylaxis only for future generations since it must operate during the calcification and growth period of life in order to be effective. For our present population he recommended the topical application of fluoride to the teeth for its caries-prophylactic effect.

(4) Dr. Allen O. Gruebel, D.D.S., M.P.H., director, Div. of Public Health Dentistry, Missouri State Board of Health, pointed out that the discovery of the fact that a fluoride concentration of 1 p.p.m. in the drinking water will materially reduce the incidence of dental caries (if used during the period when the teeth are being calcified) offers extremely important possibilities from the public health point of view. It should serve to bring the yearly incidence and accumulation of dental caries within a range where it can be more adequately dealt with by dental treatment service.

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SOCIAL INTELLIGENCE IN MEDICINE

With the advancement of civilization there is a continual demand for higher and higher social intelligence. One of the most popular subjects in our university curricula during recent years has been sociology. It makes a great appeal to the idealist who with apostolic zeal would wipe out misery and inequality on earth by some rare formula. While we would not disparage honest effort to improve the world, we must bear in mind that an idealist is inclined to be imaginative rather than literal and visionary rather than practical, and that is scarcely what is meant by social intelligence.

Under the Wagner et al bill now before the Congress, it is proposed that the American people be regimented into a federal system of socialized medicine presided over by a sort of czar who shall have power to make a list of physicians who agree to practice medicine "in accordance with such rules and regulations as may be prescribed" by him. All wage earners, rich and poor, are compelled to pay the federal government for their medical services,

but, in case of sickness, they must employ a government physician or lose their "benefits." The patients would be government patients, the money government money and the physicians government physicians. We believe that our citizens will be loath to accept government subsidy with its unprecedented bondage in any planned economy of this kind. They want to be paid their wages and spend the money they have earned on the doctor of their choice. It would take something intimate out of the sick room and death-bed scene if they were denied this privilege.

The proponents of the bill can see nothing but selfishness in the opposition of medical men to its enactment. Is it selfishness to look with disfavor on a scheme that assures them payment for their services? Is it selfishness that prompts them to oppose restricted hours of work and definite periods of rest? Is it selfishness to show a human understanding of the people's needs? Is it not social intelligence, based upon experience in building up the finest system of voluntary medical care enjoyed by any country in the world?

A. E. H.

WAR, TIME AND BOOKS

Every war produces a marked increase of neuroses on the home front. But wars also produce an increase in organic disease. Nowadays we don't speak of "functional" diseases quite as blithely as we used. We have learned much about the changes that can be produced in the organs themselves by prolonged anxiety and grief. So it is not only the shortage in medical men that fills the waiting-rooms to overflowing, but also the mounting numbers of ulcers, hypertension, hearts and so on. Fortune-tellers, astrologists, spiritualists and other charlatans reap a harvest they never know in peace times and at least a percentage of this harvest they owe to the fact that doctors are too busy to meet all the emotional as well as physical demands their unhappy patients would make upon them. Anxious men and women, if they are intelligent, come to their doctors first. Most of them have thought up dozens of questions they mean to ask. But they find a crowded waiting-room, a doctor too over-worked and tired to give much time or thought to the psychology of his patients. His explanations of his physical findings and the treatment advised are briefly outlined but too often interlarded with terms that are Greek to the worried listener. (Few medical men fully comprehend their patients' abysmal ignorance—even the better educated of them—of their bodies and their processes). These, sick in body or mind or both, had hoped for a comfortable, leisurely chat with wisdom and authority. Too many leave with their prescriptions, their diet lists and their instructions not to worry and to rest, but carrying away also the nagging anxiety that brought them there. It is easy to say that patients should be permitted and even encouraged to talk out their troubles. But where is the doctor who has the time or the patience to listen when perhaps dozens of sicker persons are waiting for him? During the last war a woman—by no means a fool—who had spent five dollars on a "numerologist" was overheard defending herself: "Of course I don't actually believe that stuff, but my doctor is terribly busy and it is worth five dollars to get anyone's concentrated attention on just me for an hour, and to really listen when I talk about myself and my problems."

If every doctor could have a trained assistant to act as a sort of glorified listening-post and a liaison-officer between him and his patient, it would be wonderful. In lieu of this we suggest books and luckily in recent years there have been available a goodly number of excellent books on medical subjects written for the layman. Why not keep a list of these in the office, write the title of the one indicated on a prescription blank and direct the patient to get it at once? Any bookstore would gladly keep a stock on hand if asked, and the patient who does not want to read up on his "case" is rare indeed. Of course no book was ever written that can take the place of a talk with the doctor, but there are sound, well-written ones that can supplement what he has said, amplify and interpret it, and save him considerable time and energy, both of which he is likely to find diminishing as the war progresses.

A list of some of the most useful of these will be gladly sent by THE JOURNAL-LANCET if requested.

M. U.

Book Reviews

Walter Reed: Doctor in Uniform, by L. N. WOOD. New York: Julian Messner Inc., 1943. vi, 277 p. Illustrations. 2.50.

This is a new life of Walter Reed written in a more popular style than those previously published. Almost half of the book narrates his life previous to his final and momentous work in determining the method of the propagation of yellow fever and the role played by the mosquito in its transmission. Reed was an energetic student in his youth and he never relaxed his ambitions and ideals during the sixteen years of the ordinary dull routine work as an army surgeon in small western army posts. It was not till he was forty, a rather advanced age, that he began the scientific medical study that later made him famous.

The book brings out the fact, often overlooked, that he was for two years stationed in Minnesota after his work at Johns Hopkins, and that he continued his work in St. Paul in the laboratory of the high school with Dr. Louis B. Wilson, then an instructor there. The tremendous and world-wide value of the yellow fever investigation, one of the great gifts of the medical profession to humanity, is not sufficiently stressed by the author. In several places, involved paragraphs obscure the author's meaning. Dr. Howard Kelly's work, *Walter Reed and Yellow Fever*, is a much better book.—JOHN M. ARMSTRONG.

Review reprinted from Minnesota History, the quarterly magazine of the Minnesota Historical Society, for September, 1943, by permission of that publication and its reviewer, Dr. John M. Armstrong. Few know that the noted medical scientist Reed lived at the midpoint of the Minnesota-Dakota-Montana military division area a generation ago.

The Dispensatory of the United States of America, 23rd Edition. The new *United States Dispensatory*, 23rd edition, has been published, and is in the process of distribution. In the seven years since the last issue, more revolutionary changes in the science of pharmacology and the art of therapeutics have occurred, than during any equivalent period in the history of medicine.

The newest edition is divided into three parts, with the general arrangement along lines formerly followed. The first section lists the drugs recognized by the *United States Pharmacopoeia*, XII, the *National Formulary*, VII, and the *British Pharmacopoeia*, arranged alphabetically by Latin titles, now verbatim. The second section considers unofficial drugs arranged by English title. Part three comprises a list of processes, reagents, solutions, and miscellaneous tables.

The new features include indications of war emergency replacements, formulas for clinical laboratory reagents, information on new synthetic remedies (sulfonamides, vitamins, sex hormones, etc.), biologicals and endocrine preparations and articles on glucosides, etc.

Essentials of Syphilology, by RUDOLPH H. KAMPMEIER, M.D. Philadelphia: J. B. Lippincott Co., 1943; 516 pages, 87 illustrations; red cloth, black embossed; \$5.00.

A very interesting and well written book on syphilis and its problems of the present day. The author's objectives are laudable in that his aim is to stimulate a better routine in the entire management of the disease, as well as to educate the patient. Sociological aspects are also dealt with. The illustrations are clear cut and instructive, and the entire subject is well covered. This book is an educational step in the conquest of syphilis and is recommended not only to physicians but also to students and social workers.

News Items

Dr. Roscoe C. Webb, president of the Minneapolis chapter of the American College of Surgeons, acted as chairman of the committee on arrangements for an all-day war session March 2 which brought to Minneapolis physicians from the northwestern area of the United States. This was one of twenty-two such regional meetings. Army and navy medical officers joined with Minnesota, North Dakota and South Dakota doctors and hospital representatives to view motion pictures showing activities of the medical corps of both services and to discuss experiences in the theaters of operations. The discussions included war wounds, fractures, navy war surgery, fractures and medical service in war plants. Representatives of the surgeons general of the Army and Navy participated. Evaluation of the use of sulfa compounds, the status of penicillin, treatment of burns, transportation of wounded, rehabilitation, endemic and epidemic diseases and aviation medicine and surgery were other features of the session. 450 attended.

Principal speakers were Dr. Thos. B. McKneeley, chief of the emergency medical section of the United States public health service who spoke on "Wartime Problems in Communicable Disease Control" and "Emergency Medical Service in Wartime Disasters", Col. Grover C. Pemberthy, Omaha, surgical consultant for the army's Seventh service command, on "War Wounds of the Extremities", Capt. Fredk. A. Jostes, St. Louis and Great Lakes naval station on "Naval War Surgery" and Maj. Boardman M. Bosworth, Bronxville, New York, and Washington, D. C., army medical corps, Commander Harry R. Huston, Dayton and Great Lakes Naval station. Dr. Webb had wide experience in battle-front surgery during World War I and participated in many of the activities recounted in the war record "Stretchers" written just after the cessation of hostilities, a record of his hospital unit.

Dr. Richard Bardon was elected chief of staff of St. Mary's hospital, Duluth, at a dinner meeting February 3. Chief-of-staff-elect is Dr. John R. McNutt, secretary, Dr. Herbert O. Hoff.

Dr. Lloyd L. Merriman was the choice of the medical staff of St. Luke's hospital, Duluth, as chief for 1944. Other officers: vice chief, Dr. O. L. McHaffie; secretary, Dr. Selma Mueller.

Dr. Christian F. Carstens was elected chief of staff at Hibbing (Minnesota) General hospital, at a dinner meeting held to commemorate the completion of the institution's second year of service.

Dr. Danl. F. McCann of Bemidji, Minnesota, was raised to the presidency of the Upper Mississippi Medical society at its annual meeting in Brainerd January 29.

Dr. Albert J. Emond, Farmington, Minnesota, has been elevated to the presidency of the Dakota County Medical society.

Dr. Martin J. Bechtel, a graduate of the University of Minnesota School of Medicine, has gone to Warren, Minn., where he will be associated with Dr. C. H. Holmstrom, of the Warren Clinic.

Dr. Paul Cress has reopened the Ellsworth, Minn., Hospital, which has been closed since 1942, when Dr. Cress's father, Dr. Peter Cress, moved to California. Dr. Paul Cress recently completed his internship at Minneapolis General Hospital, after graduation from the University of Minnesota School of Medicine.

The Clay-Becker Medical Society has elected Dr. V. D. Thysell, of Hawley, Minn., president; Dr. A. R. Ellingson, of Detroit Lakes, vice president; and Dr. Carl Simison, of Barnesville, secretary-treasurer.

The Emergency Maternal and Infant Care Program, described in the October issue of the JOURNAL-LANCET, is now operating or is in the process of being established in all but three counties of California—Shasta, Alpine, and Mono. Proper hospital facilities are lacking in these three counties.

A total of 207 hospitals are now cooperating, with 37 health officers administering the program in local health jurisdictions. Seven county hospitals have opened their facilities to private physicians in order to make adequate hospital care available to patients under this program. During October 1, 781 wives and infants of enlisted men were accepted, and \$231,717.16 was encumbered for their care. The average cost per case, based on these figures is \$130.

Resigning his post to return to private practice, Dr. Walter P. Gardner, superintendent of the Anoka State Hospital at Anoka, Minnesota, has entered a partnership with Dr. W. H. Hengstler, of St. Paul. Dr. Gardner, former president of the Minnesota Hospital Association, is a clinical assistant professor at the University of Minnesota Medical School.

Dr. Wm. P. Hamilton of Dodgeville, Wisconsin, has been commissioned a lieutenant in the United States Naval reserve, with orders to report for duty at Great Lakes Navy Training station.

Dr. Danl. W. Wheeler of Duluth has been promoted to captain in the United States naval reserve officer medical corps. An internist, Dr. Wheeler left Duluth two and a half years ago with a lieutenant commander commission and has served since at Puget Sound Navy yard, Bremerton, Washington.

Dr. Percy A. Mattison of the Winona clinic has been sworn into the navy medical service in Minneapolis with rank of lieutenant commander, reporting at Great Lakes Illinois, March 15.

Lieutenant Commander Fredk. F. Wipperman of Minneapolis, after eighteen months service as flight surgeon on an aircraft carrier in Pacific war theaters, has been transferred to the navy bureau of medicine and surgery at Washington, D. C. His specialty is eye, ear, nose and throat practice. He served a year as medical officer at Minneapolis navy air station after which he received flight training at Pensacola, Florida. He is now in his fourth year of military service.

According to President Walter C. Coffey, of the University of Minnesota, the University's medical school has had perhaps the heaviest of all wartime demands made of it during the past year. With the burden of decreased staffs and increased enrolment, the school has also had the added problem of absorbing the pressures of war research.

Dr. Ancel Keys, who edited the *JOURNAL-LANCET's* special vitamin issue in November, has used all the facilities of the department of physiological hygiene in the study of military problems. Among his contributions are the Army's emergency "K" ration, the demonstration that there is nothing to be gained by adding sundry vitamin supplements to the excellent diets already used in the Army and Navy, and the demonstration of the importance of the circulation in heat collapse.

Other staff members whose work was commended by President Coffey include Dr. Cecil Watson, of the department of medicine; Dr. Owen Wangenstein, of the department of surgery; Dr. Wesley Spink, associate professor of medicine; Dr. Maurice B. Visscher, Dr. Karl Sollner, Dr. Nathan Lifson, Dr. Allen Hemingway and Dr. Frederick Kottke, of the department of physiology.

Dr. George T. Ayres and Dr. H. N. Sutherland, of Ely, Minnesota, have announced the dissolution of their partnership, which took effect on Dec. 31, 1943. Dr. Ayres has retired from practice, and his share of the Shipman Hospital, of which he and Dr. Sutherland were the proprietors, has been taken over by Dr. Jack P. Grahek, also of Ely.

Dr. Ivan Linsin, one time practitioner at Parker, Arizona, more recently in charge of the government hospital at Elbowoods, North Dakota, has removed to LaMoure where he will take charge of the LaMoure hospitals.

Dr. Ralph L. Towne of Kalispell, Montana, has returned to his practice at that point after the completion of a government assignment as a member of the surgical staff of the central clinic for Douglas aircraft workers in Santa Monica, California.

Dr. Salvator G. Marino has taken over a medical post at Turtle Mountain agency of the Indian service, at Belcourt, North Dakota, which has been lacking an incumbent for some time. He will have charge of the hospital and health program. Dr. Marino was formerly at the Rosebud agency in South Dakota.

Dr. J. Stratte of Warren, Minnesota, has joined the staff of the Johnson clinic at Rugby, North Dakota, to serve during the absence of Dr. O. W. Johnson.

John A. Sivert, formerly business manager of Sivertsen Clinic, Minneapolis, has been appointed superintendent of Deaconess hospital, Bozeman, Montana. In changing his residence he forsakes the scene of over forty years' activities and takes with him the goodwill of local medical men.

Kandiyohi-Meeker-Swift County Medical Society members to the number of twenty met at Willmar, Minnesota, January 19 for their annual meeting. Dr. Richard E. Anderson of Willmar was elected president, Dr. Alice C. Fredrickson, Willmar, vice president, Dr. Jno. C. Jacobs, Willmar, secretary-treasurer.

The Third District Medical society of South Dakota held its first 1944 meeting at Bates hotel, Brookings, February 18. Members, Auxiliary co-workers and guests numbered thirty. Following a dinner Major Stein of the station hospital at Sioux Falls Army Air Force Technical Training base addressed the assemblage as a part of the society's scientific program.

The following officers were elected for the year 1944: President—E. S. Watson, Brookings; vice president—M. Dobrinsky, Estelline; secretary-treasurer—C. M. Kershner, Brookings; delegate—E. H. Grove, Arlington; alternate—C. E. Sherwood, Madison; censors—H. A. Miller, Brookings, J. R. Westaby, Madison, and J. A. Muggly, Madison.

Two former members of the district society left the state to practice elsewhere. These are: Dr. F. W. Orvedal of Lake Preston and Dr. Ed. T. Torwick of Volga. One new member was admitted to the society—E. A. Hofer, now located at Howard. Dr. F. E. Boyd, Jr., of Flandreau, is in the Service. There are nineteen active members of the Third District society.

The Seventh District auxiliary to the South Dakota state medical association, met February 8 at the home of Mrs. Anton Heyden, Sioux Falls, with sixteen members present. Co-hostesses with Mrs. Heyden were Mmes. M. Stuart Grove, L. J. Pankow and Edwin S. Stenberg. The auxiliary will entertain the doctors of the district on March 2 at the Sioux Falls YMCA tearoom.

North Dakota's Stutsman county medical society met at Moline cafe, Jamestown, February 10 and elected Dr. Jos. Sorkness president, Dr. Floyd O. Woodward vice president, Dr. E. J. Larson secretary-treasurer. "Blood Chemistry" was the topic of an address by Dr. Edwin J. Kepler, who is a member of the staff of the Mayo clinic, Rochester, Minnesota.

Silver Bow county medical association held its first meeting of the year at Finlen hotel, Butte, Montana, January 31, with its newly-elected president, Dr. Jas. E. Garvey, presiding. Dr. Chas. R. Canty of Butte presented a scientific paper, "Coronary Heart Disease."

Cascade county medical society, meeting February 11 at Great Falls, Montana, entertained as its guest speaker Lt. Comdr. Ernest A. Zinke, senior medical officer of naval procurement in Seattle, Washington, whose labors in connection with passing on the physical qualifications of young women enlisting in the Waves, brought him to Great Falls from his former posts at Pearl Harbor and other South Pacific locations. He had served on cruisers and destroyers, was in two sinkings. His topic was the navy's wartime advances in medical science and interspersed were the stories of his service experiences.

Dr. Bernard S. Clark, who entered the army from practise at Spearfish, South Dakota, is now after two and a half years in the service, stationed at O'Reilly General hospital, Springfield, Missouri.

Dr. O. S. Craise of Towner, North Dakota, has been appointed as physician member of the McHenry county board of health.

Wahpeton (North Dakota) doctors crossed the river to Breckenridge, Minnesota, January 15 for a joint meeting at the St. Francis hospital which followed a dinner served by the sisters who, with the graduate nurses, formed part of the audience. Speakers were Lieutenant Holmes, physician at the navy training station, and Dr. Rudolph W. Koucky, pathologist for the hospital, who spoke on gastrointestinal lesions and showed a selection of excellent kodachrome slides of tumors and diseases of the gastrointestinal tract. Dr. Holmes took as his topic Tropical Diseases.

Dr. Gilbert Cottam, South Dakota state board of health superintendent, on February 17 announced the admission to practice in the state of Drs. E. C. Bobb, Mitchell, and Werner Nathan, Yankton, by examination and Drs. F. J. Gilbert, Belle Fourche, Esten Hendricks, Woonsocket, and Geo. Gordon, Chicago, by reciprocity. Dr. Gilbert was for two years a staff member at Boulder county hospital and Boulder sanitarium, Boulder, Colorado. His native city is Belle Fourche, in whose schools he was an honor student, and to which he returns to practice medicine and surgery.

Dr. Otto G. Klein of Helena, Montana, was in Chicago the third week of February attending the annual Congress on Medical Education and Licensure and the national Conference on Medical Service as well as several special clinics. He is executive secretary of the state board of medical examiners.

Dr. Wallace E. Herrell of the Mayo clinic staff, assistant professor of medicine in the Mayo foundation, was awarded the Distinguished Service Key by the Rochester (Minnesota) Junior Chamber of Commerce. Last August, collaborating with Drs. Luther Thompson and E. N. Cook, he published the first clinical report on the successful use of penicillin in treating gonorrhoea.

Drs. John H. Garberson, Miles City, and Fred F. Attix, Lewistown, have been named directors of the Montana Hospital association for three-year terms.

Dr. Franklin T. Younker after twelve years of practicing at Galesville, Wisconsin, leaves to become the head of a hospital at Sisseton, South Dakota. For two years he maintained his own hospital at Galesville, before which he was a member of the staff of Winona General hospital and of the visiting staff of the St. Francis hospital, LaCrosse.

Dr. C. A. McKinlay was elected president of Asbury hospital medical staff; Dr. D. R. Hastings, vice president, and Dr. Charlotte J. Morrison, secretary-treasurer.

St. John's hospital, Helena, Montana, has selected the following staff for 1944: president, Dr. Sidney A. Cooney; vice president, Dr. Jas. M. Flinn; secretary-treasurer, Dr. Edward L. Gallivan. Elected to the executive board were Drs. Orville M. Moore and Robt. M. Morgan.

Dr. Peter T. Spurck, Butte, Montana, at the regular bi-monthly meeting of the St. James hospital staff, was elected president January 28. The annual banquet in honor of the staff was given by the Sisters of Charity on February 4.

Dr. Herbert T. Caraway, Billings, Montana, is the new chief of staff at Deaconess hospital, Billings.

Dr. Frank I. Darrow, Fargo, North Dakota, is a member of the executive committee of the state Hospital Service association as the result of the fourth annual meeting of the association held at Fargo January 19.

Dr. Albert D. Corniea was elected chief of staff of St. Barnabas Hospital, Minneapolis, at the annual medical staff dinner February 2. Dr. K. W. Wilder was elected vice chief and Dr. Lloyd A. Whitesell, secretary. The executive staff includes Drs. Elmer J. Lillehei and Wm. B. Roberts.

Dr. Ludwig J. Seibel, formerly of Harvey, North Dakota, now heads a hospital at Reedley, California, for the duration. Since leaving Harvey he has been practicing at Lodi, California.

Dr. John D. Graham of Devils Lake, North Dakota, contributor of a paper in this issue of JOURNAL-LANCET, has been reelected president of the Devils Lake district medical association with Dr. J. G. Vigeland of Brinsmade vice president and Dr. Jno. C. Fawcett, secretary-treasurer.

Dr. Frank J. Hill, North Dakota state health officer with offices at Bismarck, met with Dr. Edw. F. Daily, director of the division of health services, children bureau, Washington, D. C., in Grand Forks January 29. The public health advisory committee of the state joined the two officials to work out an emergency maternity and infant care plan, the "Emic" program.

C. F. McDermott, burn technician, has been giving instruction in burn therapy at army, navy and coast guard installations in the middle west, having visited at army air force technical training commands at Sioux Falls, South Dakota, Tomah, Wisconsin, and Fort Dodge, Des Moines, Iowa, Camp McCoy, Sparta, Wisconsin, Fort Snelling, Camp Williams and Camp Douglas, Wisconsin. He has delivered his talk before twenty-two outgoing hospital units, as well.

Dr. Clifford Wadd, Janesville, Minnesota, is the new president of Waseca County Medical society.

Dr. Daniel Blain, War Shipping administration Deputy Medical Director and United Seamen's Service Medical Director, whose contribution on war neuroses in December JOURNAL-LANCET has been quoted extensively, recently visited seven merchant marine rest centers and seamen's clubs from coast to coast. Governor Moses of North Dakota and Governor Sharpe of South Dakota are two of thirty-eight governors who have become sponsors of the merchant seamen's service. There are 2500 such sponsors, most of them persons of national prominence.

The Office of Civilian Defense has announced that one of the 40 "Affiliated Base Hospital Units and Surgical Teams," sponsored by the hospitals and medical schools of eight Western states, is composed of medical volunteers from Great Falls, Montana. The teams will be called upon by the War Department only in the event of an extraordinary military necessity.

The health of our soldiers gets every consideration. One of the most recently developed health-protectors is a health bomb designed for troops stationed in the jungles, where disease-carrying insects are too numerous to mention. The bomb is really a liquid-insecticide sprayer and helps combat such jungle diseases as malaria and yellow fever. It can fumigate 150,000 cubic feet of space, or the equivalent of 240 army pup tents.

Through the courtesy of Dr. Daniel Blain, deputy medical director of the War Shipping Administration and medical director of the United Seamen's Service, the *JOURNAL-LANCET*, to which Dr. Blain has been a contributor, has learned of the formal opening of the new national headquarters of the Medical Division of the WSA and USS at 107 Washington Street, New York City. Marshall E. Dimock, assistant deputy administrator of WSA in charge of its Recruitment and Manning Organization, presided. Mathew Little, bos'n, 82 years old and still sailing in the merchant marine, described some of his experiences in sixty-three years at sea.

The Office of Price Administration has issued an amendment to Ration Order No. 16 (R.O. 16, Amendment 25) which permits the use of rationed fats and oils for external therapeutic purposes. This includes the use of vegetable oils, such as cottonseed oil, for bathing newborn infants, for external application in skin diseases, especially eczema, for urethral injection or lubrication of urethral instruments, and for X-ray visualization. Under the provisions of the amendment, such use of rationed fats and oils is defined as "industrial consumption." Persons using these products for such purposes are classified as "industrial consumers." An industrial consumer engaged in the care and treatment of the sick and needing rationed fats and oils for this purpose may apply to his district Office of Price Administration for a certificate with which to acquire them.

Irving R. Vaughn, assistant director of vital statistics for the South Dakota State Board of Health, is authority for the following figures: Births in South Dakota during the year 1942, exclusive of stillbirths, 12,343. The crude birthrate per 1000 population was 19.2. The national crude birth rate for 1942 was 20.7. From these figures we note that the population of South Dakota is increasing, from births, at a rate of 1.5 child per 1000 population less than the nation as a whole. There were a total of 8654 deaths, from all causes, recorded for South Dakota during 1942. The crude death rate for South Dakota was 13.5 per 1000 population, while the national crude death rate was 10.3 persons per 1000 population. South Dakota may, therefore, look for a decrease in population. Of the 8654 deaths, 3785 resulted from ten major causes. Their number and the ratio per thousand population: Heart disease, 1353 (2.1); cancer, 672 (1.1); apoplexy, 540 (.9); nephritis, 314, .5; pneumonia, 242 (.4); senility, 173 (.3); tuberculosis, 165 (.26); premature birth, 149 (.23); diabetes, 132 (.2); appendicitis, 45 (.07). Accidental deaths accounted for an additional 396. Of these 107 were from falls, 82 from automobile driving, 32 from drowning.

The Federal Security Agency, U. S. Public Health Service Division of Nurse Education, Washington, D. C., announces that the National Nursing Council for War Service and the Division of Nurse Education have prepared a new folder entitled "You . . . and Professional Nursing." It is designed to assist candidates in choosing the schools of nursing best equipped to prepare them for the particular phase of nursing they intend to enter upon graduation. It also details the opportunities open to young women in professional nursing. It is being sent to hospitals, schools of nursing participating in the U. S. Cadet Nurse Corps program, state and local nursing councils, state and regional hospital associations, state health departments, nurses' associations, leagues of nursing education, directors of public health nursing, vocational guidance directors and other professional groups. Additional copies may be obtained from the National Nursing Council for War Service, 1790 Broadway, New York 19, New York; or the Division of Nurse Education, U. S. Public Health Service, Federal Security Agency, Washington, D. C.

The situation in Valley City, North Dakota, is typical of the national scene as regards the dearth of doctors. With twelve practising physicians at the outbreak of the war the personnel of the community's physicians is now reduced to six with the death of Dr. Campbell. In Sioux Falls, South Dakota, the normal proportion of physicians to population is as 1 to 700. At present it stands 1 to 2,000. Death, service in the armed forces and a removal or retirement here and there plays havoc with medical resources. The prospect for improvement is slight. Most states require doctors coming from other states to take new medical examinations which are held only a few times a year. Only seven states, no one of them in this locality, grant temporary licenses to doctors awaiting examination. The relation between the United States Public Health Service and the medical bodies admits of much improvement. The invasion of America by mankind's oldest and deadliest enemy—sickness—is something against which to prepare.

Necrology

Dr. Mars Madsen, 46, of Canova, S. D., died suddenly January 8, 1944, as the result of a heart attack. Dr. Madsen was graduated from Rush Medical College in Chicago, and after an internship at Queen's Hospital in Honolulu, he practiced medicine in Hawaii for eleven years, returning to the United States in 1936. He practiced at Webster and Sisseton, S. D., before taking charge of the hospital at Canova.

Dr. W. L. T. Goodison, 70, of Larimore, North Dakota, died suddenly on January 14 of a heart attack. Dr. Goodison, who was well known both as a doctor and as a lawyer, practiced medicine in Larimore for ten years, but during the last several years he had devoted his time to law. He was educated at Hamline University in St. Paul; Jefferson Medical College in Philadelphia; Johns Hopkins Medical School; and New York University.

Dr. Christian J. Engelson, 83, of Brookings, South Dakota, died January 18th at Municipal hospital, Brookings. He was one of the veteran physicians of the state, having practised in Brookings for thirty-two years, half the city's existence. He graduated from the college of medicine of the University of Denver in 1905. Dr. Engelson is one of two members of South Dakota Third District Medical Society lost within the last year, the other being Dr. Henrik Tillisch, also of Brookings.

Dr. Edwin E. Webber, 65, founder and head of the Webber Hospital in Duluth, died on January 17. Dr. Webber, a graduate of the University of Michigan and the Jefferson Medical College in Philadelphia, first practiced in Grand Rapids, Mich. From there he went to Denver, and after a few years in practice there, he moved to northern Minnesota, living in Chisholm and Proctor before coming to Duluth in 1926.

Dr. Andrea E. Hall, 70, died on January 17 at her home in Virginia, Minnesota. Dr. Hall went to Virginia after completing work at the University of Minnesota Medical School, becoming a lumber camp doctor for a short time at Cusson. She was known to hundreds of early day miners, lumberjacks, and Indians, whom she treated.

Lt. Commander Porter M. Hoidale, 33, of Tracy, Minnesota, died January 21 at Klamath Falls, Oregon.

Dr. Jas. Phaon Caldwell, 60, of St. Paul, died January 24th in Midway hospital, St. Paul.

Dr. Roy C. Thompson, 67, Wilton, North Dakota, died February 8 at a Bismarck hospital where he had been a patient for a week. Cerebral hemorrhage was the cause. Dr. Thompson was a native of Lestowel, Ontario, Canada, and a graduate of Trinity college, Toronto. He went to Wilton in 1901 and practised there continuously to the time of his death.

Dr. Daniel H. Bell, 70, of Tacoma, Washington, died at his home there February 16. His early practice in his specialty, eye, ear, nose and throat, was at Kenmare, North Dakota.

Dr. Arnold Schwyzer, 80, of St. Paul, who had practiced medicine and surgery in that city for fifty-three years, died February 19 in his home after an extended illness. Dr. Schwyzer, Swiss by birth, was a member of the Swiss medical society as well as of the American surgical, Western surgical, St. Paul surgical and International surgical societies. For many years he was chief of the St. Joseph's hospital staff.

Dr. Jonas Samuel White, 72, formerly of St. Paul, retired in 1939 and residing at Salisbury, Maryland, died February 20, having suffered a stroke.

Dr. Henry M. Waldren Sr., 69, of Drayton, North Dakota, pioneer physician and surgeon in the northeastern section of the state, died February 21 at University hospitals, Minneapolis. He was a past president of the North Dakota State Medical association and prominent in Grand Forks district affairs as well as in the Mystic Shrine of which he had been a potentate.

Dr. William Campbell, 46, Valley City, North Dakota, died February 21, at Valley City. He was a graduate of the University of Manitoba and had been in practice for seventeen years as a physician and surgeon.

Dr. C. W. Tinker, 87, of Stewart, Minnesota, was found dead recently in his room in a Minneapolis hotel. Dr. Tinker had come to Minneapolis for medical treatment.

Dr. Frank Clifford, of West Concord, Minn., died on December 30, 1943, after a long illness. He was 80 years old.

Dr. R. M. Bright, a pioneer Minnesota doctor, died on December 21, 1943, at Walker.

Future Meetings

MISSISSIPPI VALLEY MEDICAL SOCIETY TO MEET IN PEORIA; NEW OFFICERS ELECTED

The Tenth Annual Meeting of the Mississippi Valley Medical Society will be held at the Pere Marquette Hotel, Peoria, Ill., next September 27 and 28. The officers recently elected are: president, C. Paul White, Kewanee, Ill.; president-elect, Grayson L. Carroll, St. Louis; first vice president, Milton E. Bitter, Quincy, Ill.; second vice president, E. A. Cunningham, Louisiana, Mo.; third vice president, Con R. Harken, Osceola, Ia.; and secretary-treasurer, Harold Swanberg, Quincy, Ill. Members of the board of directors: (Illinois) Charles Harmon, of Springfield; G. A. Sihler, Jr., of Litchfield; L. H. Sloan and C. C. Maher, of Chicago; E. F. Parker, of Moline; E. E. Nystrom, of Peoria; and Ralph McReynolds, of Quincy; (Missouri) F. J. Tainter and Clyde Dyer, of St. Louis, and W. F. Francka, of Hannibal; (Iowa) F. A. Hennessy, of Calmar; J. H. Randall, of Iowa City; and B. J. Dierker, of Ft. Madison. Although no scientific exhibits were shown last year, they will be a feature of the Peoria meeting next September.

The Society has established an Endowment Fund which is already a going affair with a \$500 appropriation. All contributions to the Endowment Fund will be invested in War Bonds. A new Life Membership Plan, whereby the fee paid will depend upon the applicant's age, has been adopted, and new, attractive Life Membership certificates have been authorized. All Life Membership fees will be placed in the Endowment Fund.

A.M.A. SCIENTIFIC EXHIBIT AT CHICAGO

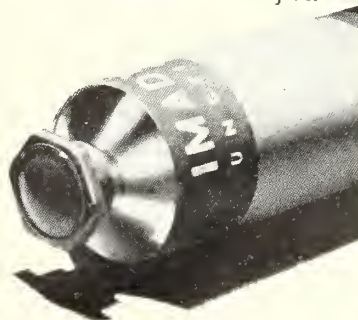
The scientific exhibit at the Chicago session of the American Medical Association, June 12 to 16, 1944, will be held at the Palmer House. Exhibits will cover all phases of medicine and the medical sciences with particular emphasis on graduate medical instruction for the physician in general practice. Thomas G. Hull, director of the scientific exhibit, will furnish application blanks for space if addressed at 535 N. Dearborn St., Chicago, 10.



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IMADYL UNCTION 'ROCHE'

The seventh annual postgraduate course in ocular surgery, pathology and orthopedics will be given at the George Washington University School of Medicine, 1335 H Street, Northwest, Washington, D. C., Monday, April 24th, to Saturday, April 29th, 1944, inclusive. The course embraces normal histology of the eye; inflammations, general and specific; phthisis bulbi; glaucoma; cataract; arterio-sclerosis; albuminuric retinitis; intra-ocular and epibulbar tumors; practical orthoptics with case demonstrations, and operations on animal eyes under direction of the instructors. The following operations will be performed: Combined intracapsular cataract extraction; Elliott's sclerocorneal trephine, cyclodialysis, LaGrange, iridectomy, iridotaxis, iridencleisis, Jameson recession, Reese resection, Worth advancement, and O'Connor cinch. Registration is limited to 30.

Classified Advertisements

PHYSICIAN WANTED

Physician, draft exempt, to join medical staff at North Dakota State Hospital. Write Superintendent at Jamestown, North Dakota, for particulars.

EXCEPTIONAL OPPORTUNITY

for beginning or established physician to share suite of offices with another physician or dentist. Individual treatment room or laboratory, in new office building located in very best residential retail section. Address Box 761A, care of this office.

PHYSICIAN-SURGEON WANTED

Wanted,—physician-surgeon to operate 12-bed hospital in good farming community in southeastern South Dakota. Reasonable rent. Large territory, including several nearby towns to draw from. Only hospital in county; nearest hospital 30 miles. Recent death cause of vacancy. If you have average ability and are satisfied with life in small wide-awake town, here's an opportunity that isn't always available. Dean C. Tripler, Canova, S. D.

FOR SALE

Hospital equipment: furniture, beds, linens, dressings, solutions. Write Shakopee Hospital, Shakopee, Minn.

Advertiser's Announcements

A NEW, SIMPLIFIED TREATMENT FOR SECONDARY AMENORRHEA

Roche-Organon, Inc., Nutley, N. J., announce a new, simplified treatment for secondary amenorrhea of less than two years' duration. This treatment is free from the disadvantages of the previously employed method which required 13 injections over a period of 25 days.

Until recently, it was believed that in order to elicit uterine bleeding in amenorrheic women, the endometrium had first to be stimulated with estrogens before the secretory phase could be induced by means of luteal hormone. Zondek (*J.A.M.A.*, 1942, 118:705), who devised the new, simplified method of treatment which requires only two injections given on two successive days, demonstrated that complete proliferation of the uterine mucosa is unnecessary and bleeding may be provoked by corpus luteum hormone.

Zondek found that in cases of secondary amenorrhea of less than two years' duration the injection on two successive days of a combination of 2.5 mg. of alpha-estradiol benzoate and 12.5 mg. of progesterone, mixed in the same syringe, will usually suffice to induce uterine bleeding. For the convenience of the

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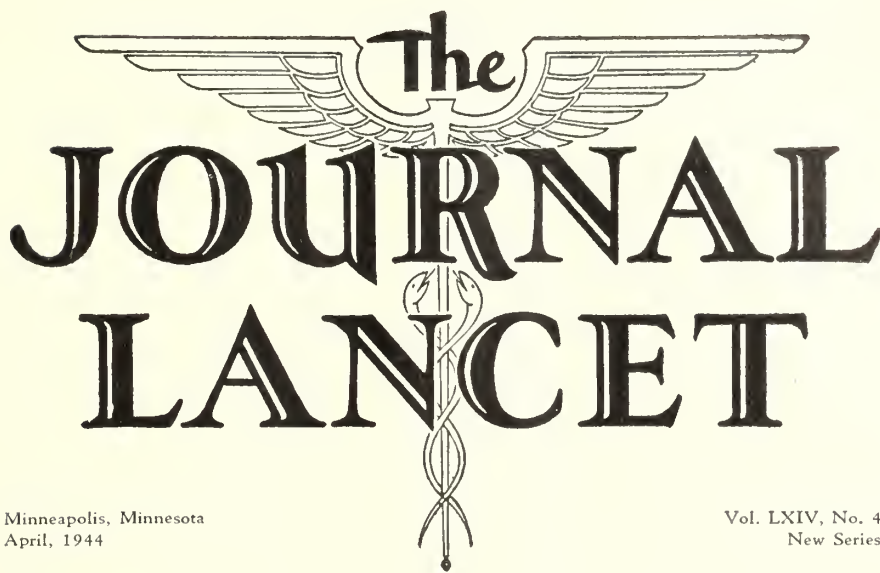
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Minneapolis, Minnesota
April, 1944

Vol. LXIV, No. 4
New Series

A War and Post-War Menace

Kendall Emerson, M.D.†

New York City, New York

Health and preventive medicine command major attention during a period of war. Interest centers both in the current effect of war on the health of armed forces and civilians, and in the post-war results to be anticipated from the strain of prolonged conflict. The ill effect of both on the incidence of tuberculosis is especially to be feared.

So far as our meagre knowledge goes European countries are already showing the result of privation in sharply rising death rates from this disease. Undernourishment, persecution and forced migration of large populations are claiming their toll. With the severe dislocation of public health facilities and the requisition of intact hospitals for sick and wounded soldiers conditions will grow worse.

With us the first two years of war has shown no general rise in tuberculosis mortality. Indeed there has been a slight decline save in sporadic areas where the rate has increased. Despite vast enlistment of physicians and nurses and the closing of some sanatoria for lack of personnel, we have run thus far on momentum previously acquired. Mass x-ray programs among recruits and civilian workers have segregated certain unsuspected spreaders of infection that would not otherwise have been found. Standards of living have risen with full employment of man power and the general level of health has been good with no serious epidemics intervening. The present situation may be surveyed with undeniable satisfaction.

We cannot view the future, however, with equal complacency. Five thousand men from the armed forces have already been discharged for tuberculosis, and this from a group supposed to be free from infection. Thousands

more will come. Far too many still active cases are leaving sanatoria against advice, tempted by the promise of high wages in industry. Many of these will suffer serious results themselves and all may threaten others in their homes and at their work.

In Lancashire there has been an alarming rise in the rate of tuberculous infection among the young women employed in munition factories. We in this country may well look forward with apprehension to the late effect on this population group, so many of whom have assumed new and unaccustomed activities.

The strain of overwork, the accelerated tempo of life under war conditions, perhaps the indiscretions in the mode of living among those with unwonted money to spend, these and other causes paint dark shadows in the picture of the future.

Meanwhile we are doing far too little in the way of preparation to forestall these post-war threats. More beds for the tuberculous will be sorely needed if we are to meet the emergency. Construction requires time. As yet we are scarcely at the blue print stage.

Increase in our equipment for mass roentgenography is essential. Industry, both management and labor, are becoming keenly aware of this need. The importance of discovering the minimal case is being popularized. This puts a new obligation on practicing physicians, and especially on the teaching of medical students. The diagnostic alertness of the entire profession will be put under heavy strain if we are to do our part. Through coordination of medicine, public health, business, and an informed public the post-war menace of a rise in tuberculosis mortality may this time be averted. Nothing less will suffice.

†Managing Director, National Tuberculosis Association.

Medical Students and Tuberculosis

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THIS is a report of a group of twenty-four medical students from a mid-western school, before and after known exposure to patients with active tuberculosis. The school records were not available for the results of the Mantoux tests but the data collected here is from a circular from which there was a 100 per cent response.

For the academic year 1939-40, the group attended all the same classes and their living conditions outside of school were essentially the same. The only known contacts the first half of the year were at an institution where the students performed autopsies, many of them on patients who had tuberculous cavities in the lungs. Rubber gloves and aprons were worn over the street clothes but no masks were used nor was the room cleaned thoroughly between autopsies.

The second half of the year the students continued with the postmortem examinations and in addition were enrolled in a course in physical diagnosis. Many of the patients used as clinical material had active tuberculosis and no precautions were taken to prevent the students from becoming infected. The facilities were far from ideal and there was lack of instruction for second year students to make them realize the dangers of poor technic in examining tuberculous patients. In the opinion of most of the group this is the reason 33 per cent of them later showed evidence of active tuberculosis.

In September, 1939, there were 20 (83.3 per cent) with negative Mantoux reactions and 4 (16.6 per cent) with positive reactions. By September, 1940, there were 22 (91.6 per cent) reactors and only 2 (8.3 per cent) who did not react to the Mantoux test. Of the 4 reactors in 1939 none showed any evidence of active tuberculosis by x-ray in October 1940. From those findings it is unlikely that any member of the group was responsible for the spread of the disease.

The first case of active tuberculosis was diagnosed in February, 1941. This student was hospitalized, then later put at bed rest at home, returning to school in January, 1943.

The next was hospitalized for pneumonia in May, 1941, and the diagnosis of active tuberculosis was made in July, 1941. In August a partial artificial pneumothorax was started and is still being maintained. He returned to school in April, 1942.

The third case was diagnosed in May, 1941. The patient was put at bed rest for several months and had arrested the process by November, 1941.

One case showed suspicious areas of increased density in both apices in November, 1940. A year later the disease was still present but in January, 1942, it was classified as arrested.

This next case had had tuberculosis with successful treatment in a sanatorium at the age of 14. There was no evidence of activity until June, 1942, when a cavity was present in the right lung and the sputum contained

tubercle bacilli. Treatment was instituted at a sanatorium and the patient was able to start an internship in April, 1943.

Another student in March, 1941, had a questionable or doubtful diagnosis, but in July the diagnosis of tuberculosis was confirmed. One year later he had positive sputum and was put at bed rest in a sanatorium until December, then resumed his internship in March, 1943.

Because of the number of the group that were showing activity another was examined and was found to have active pulmonary tuberculosis. The lesion was minimal and by a strict program of rest and diet he was able to gain twenty-five pounds in weight and in November, 1941, the evidence of disease had nearly disappeared.

The next case had bilateral lesions in the apices, in June, 1942. He spent six months in a sanatorium and was then permitted to finish his internship.

One more had had an x-ray shadow in March of 1941, at which time he had a severe cold, but six weeks later it was called healed, so this case is not included in the one-third of the group with tuberculosis.

It is the purpose of this report to show the importance of prevention and early diagnosis of tuberculosis in medical students. In answer to the questionnaire sent out, 62.5 per cent thought they had been infected while attending classes in their second year of medical school. Four of them had their primary infection before attending these classes but it is probable that 75 per cent of the whole group suffered from carelessness.

Early diagnosis of pulmonary tuberculosis is of paramount importance and the suggestions of the Tuberculosis Committee of American Student Health Association would make this possible. These are:

1. Routine tuberculin testing of incoming students.
2. Roentgen examination of all positive reactors.
3. Yearly chest films of the positive reactors.
4. Retesting every six months of all those not giving a positive reaction previously.
5. X-ray of all those when the reaction is found to change to positive.

Prevention is by far the most important factor in controlling tuberculosis among medical students. The fact that there were only 16.6 per cent who reacted to tuberculin upon entrance to the second year of medicine as compared with the 91.6 per cent who reacted a year later, indicates that the contacts made previously in the general college of at least three years and the first year of medicine, and the change of environment from their former home life to that of college surroundings could hardly be more than minor factors and supports the evidence that the group was carelessly exposed.

It is the suggestion of the author that medical school faculties include in their curricula definite programs to teach students the technic of handling patients with infectious diseases and that facilities for such precautions be provided.

Early Diagnosis of Pulmonary Tuberculosis*

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WITH our present knowledge of the cause and the mode of spread of tuberculosis, it is a great discredit to our intelligence as well as to our consciences to let about 60,000 of our population die annually from this preventable disease. It is even more tragic and inexcusable if we remember that the great majority of the victims of this white plague are either infants or youths, full of possibilities of future achievements. As in other contagious diseases, an early and correct diagnosis of tuberculosis will surely give us a good start in eradicating this controllable disease, even in the lifetime of one generation. Let us briefly consider why we should diagnose it early and how we should do it.

THE IMPORTANCE OF EARLY DIAGNOSIS

1. *Early diagnosis is important, first of all, for the sake of the patient.* The earlier a tuberculous case is found and treated the sooner the case may become arrested. In a study made by the Metropolitan Life Insurance Company of 1,041 cases treated and discharged from its sanatorium, it was found that the percentage of the well and working group from the minimal group far exceeded that from the advanced group; vice versa the number of the dead was greatest in the advanced group. The picture presented was as follows:

THREE YEARS AFTER DISCHARGE

	Pct. Well and Working	Pct. In Sana- torium	Pct. Readmit- ted	Pct. Dead	Pct. Un- known
Minimal cases	80	9	8	1.5	1.5
Moderately advanced	48	35	7	8	2
Far advanced	21	43	3	32	1

TEN YEARS AFTER DISCHARGE

	Pct. Well and Working	Pct. In Sana- torium	Pct. Readmit- ted	Pct. Dead	Pct. Un- known
Minimal cases	82	3	6	6	3
Moderately advanced	52	5	9	30	4
Far advanced	27	9	6	55	3

Just a cursory glance of these figures shows that during the 10 year period a minimal case had about three times the chance, to survive and be well and working, as the far advanced cases receiving similar sanatorium care. Likewise it is clear that far advanced cases succumbed to this disease nine times more often than the minimal cases.

In the Sioux Sanatorium that serves Sioux Indians, mostly from South Dakota, the survival ratio of the minimal cases is found to be more outstanding. In 1942 we followed up 281 cases who had left this sanatorium, with or without permission, during the four years of its existence and the result was as follows:

Minimal cases (124)—70 per cent living and working, 20 per cent living but sick, 6 per cent dead, 4 per cent

*Presented at the meeting of the Black Hills Medical Society, Deadwood, South Dakota, February 25, 1943.

unknown; moderately advanced (89)—35 per cent living and working, 35 per cent living but sick, 26 per cent dead, 4 per cent unknown; far advanced (68) 1 per cent living and working, 16 per cent living but sick, 80 per cent dead, 3 per cent unknown.

Again, out of the fifty cases discharged as arrested during this period, 46 were minimal and only 4 were moderately advanced cases.

We can present study after study from different sanatoria always with the same conclusion, that is, in a given period minimal tuberculous cases have a much better chance of being arrested than the advanced cases and in a shorter time, too, as will be mentioned later.

2. *Early diagnosis is important for the sake of the community.* As tuberculosis is a contagious disease, the earlier a case is found and isolated in an institution, the sooner the spread from that source will stop. It is almost impossible to check accurately the number of unfortunates who do come in contact with each and every case of active tuberculosis and who contract and develop active disease, due to either massive infection or lack of resistance or both, but it is not uncommon to find six or more active cases or even deaths directly traceable to a single active case who is left free to shoot these innocent victims with his invisible bullets, the tubercle bacilli. Early finding and isolating of such a case is the only sure way to stop this massacre, mostly of the relatives and friends of the patient.

3. *Early diagnosis is important for the sake of the taxpayers.* The earlier a case is found, in general, the less hospitalization and the less expense is involved in arresting it, where that is possible. Again in a study of the Metropolitan Life Insurance Company, it was found that three-fourths of the arrested minimal cases were hospitalized only one year or less, while only one-third of the arrested advanced cases were discharged in such a short time, while one-third of these arrested advanced cases took three years or more to be discharged. If we count the current expenses of a sanatorium as \$3.50 per day, it means about \$1,300 saving per year for each case that is found in minimal stage and taken care of properly.

STAGES PATIENTS ARE ADMITTED TO OUR SANATORIA

It is regrettable that the ratio of minimal cases to the advanced ones admitted to our sanatoria has not improved a great deal, during the last three decades, in spite of our efforts toward this desirable end. In order to refresh our memory, the following figures are of great interest.

	Year of Adm.	Pct. Min.	Pct. Mod. Adv.	Pct. Far Adv.	Pct. Oth- ers
National Tuberc. Assn. Survey	1914	10	28	55	7
National Tuberc. Assn. Survey	1924	14	27	41	18
National Tuberc. Assn. Survey	1928	12	43	45	—
Herman Kiefer Hospital	1932	20	30	50	—
Glen Lake Sanatorium	1939	8	35	57	—
Ah-Gwah-Ching	1940	20	18	62	—
Ah-Gwah-Ching	1941	17	17	66	—
South Dakota State San.	1941	10	28	38	24
South Dakota State San.	1942	9	18	46	27
Sioux Sanatorium	1941	22*	40	20	18
Sioux Sanatorium	1942	26*	43	25	6

*The reason why Sioux Sanatorium has comparatively higher percentage of minimal cases is that during the last six years or so Indian Service doctors are taking more x-rays of contacts and healthy individuals.

In other words, in spite of all of our efforts and education of laymen and physicians as well, 70 to 80 per cent of our sanatorium admissions are still of cases in an advanced stage.

REASONS FOR LATE DIAGNOSIS OF TUBERCULOSIS

1. *Patients do not consult the physicians early enough.* The main reason why a patient does not see his doctor in the early stage of tuberculosis is that tuberculosis in its early stages is mostly symptomless. A Metropolitan Life Insurance Company's survey of its employees showed that two-thirds of those diagnosed by fluoroscopy as cases of minimal tuberculosis, had no symptoms. How can we blame a symptomless patient when he does not see the need to consult a doctor? Other causes of not seeing the doctor early enough are lack of funds, ignorance, and carelessness.

2. *We doctors fail to diagnose cases early enough.* Everyone of us will remember case after case, of his own or of his colleagues, diagnosed and treated as chronic bronchitis, simple pleurisy, repeated colds, dyspepsia, etc., that later proved to be nothing but pulmonary tuberculosis. It is tragic that in this respect we doctors do sin almost as often as our patients and we need a change in our attitude as well as in our handling of patients, if we would remedy this deplorable situation.

3. *It sometimes is due to the nature of the tubercle bacilli and lack of individual resistance.* In spite of the fact that some patients do seek the advice of the doctor soon enough and that the physician is alert and uses all available means of diagnosis, there are a number of cases that do pass from minimal to the advanced stages of the disease in a few months or even in a few weeks. Those doctors who see many cases of tuberculosis do encounter such cases and for these there is not much that can be done. Fortunately, these cases are few in number.

The remedy of the unfortunate situation arising from not diagnosing cases early enough, is to educate our people to consult their doctors, without waiting for definite symptoms to develop, especially those who have been in contact with an active tuberculous case. Again, we doctors should have tuberculosis in mind when a patient presents himself with any symptom or complaint that even remotely suggests tuberculosis.

SIGNS AND SYMPTOMS THAT MAY SPELL TUBERCULOSIS

Doctor Malony at Saskatchewan, Canada, in checking up the complaints of 902 tuberculous patients, of all stages, found the following signs and symptoms, in order of their prevalence.

	Cases	Cases
Weakness and fatigue	467	Hemoptysis 102
Cough	463	Laryngitis 60
Chest pains	357	Sweating 48
Abdominal symptoms	192	Repeated colds 45
Dyspepsia	132	Headache 23
Loss of weight	109	Restlessness 20

If a minimal case has any complaint at all, usually it will be found to be in one or more of the groups of symptoms most often complained of. The first three in this list and the fourth and the fifth combined may be present in at least one-third of our cases who come for help, and we should keep them in mind all the time. Until we have exhausted all our clinical and laboratory means and ruled out tuberculosis, we should be reluctant to accept any other cause for them. The rest of the symptom groups, except the last two, generally remind us of tuberculosis and again, we have to use all our diagnostic measures before we diagnose them as non-tuberculous.

HOW TO DIAGNOSE TUBERCULOUS CASES EARLY

In deciding whether a case is tuberculous or not, we have in general the following means—history of contact, physical examination, laboratory examinations such as sputum, tuberculin test, and x-ray of the chest. Let us take them separately and evaluate their importance and merit.

History of contact. History of having contact with an active tuberculosis at present or in the past, is of great importance but is not a hundred percenter. It is true that in some studies made, contact history has been more prevalent than in others, but in general, many of our patients will not give us a contact history. In a checkup of 8,660 tuberculous patients at Herman Kiefer Hospital in Detroit, it was found that 45 per cent of adult tuberculous cases had a contact history but 55 per cent had no contact history. Among the tuberculous children, 56 per cent had contact history while 44 per cent had no such history. Again, from those coming in contact with active tuberculous cases only 15 per cent adults and 19 per cent children became actively tuberculous, while in the non-contact group 29 per cent adults and 13 per cent children became actively tuberculous. So, in this group the contact history, although useful, was only 50 per cent correct at its best.

On the contrary, among the Metropolitan Life Insurance group of the early tuberculous cases, only 3 per cent gave history of having contact. Hence, we shall keep in mind that contact history may be of some help, but non-contact history should not throw us out of the right track, because at its best, contact history is not accurate, especially among the less educated group.

Physical Examination. Since the discovery of the stethoscope, this seems to have been our anchor in diagnosing a case as tuberculous or not. Let us mention that

in the examination of chests for the discovery of early tuberculosis, inspection, palpation and percussion have no value at all and it is waste of time to use them and very misleading to depend on them. Auscultation may have some value, if findings are positive, but *negative findings do not exclude early tuberculosis in the majority of cases.*

Value of Breath Sound Changes. In auscultation, we generally listen for change of breath sounds and rales. If either one or both are present, doubtless they would encourage us to use finer tests for final diagnosis, but in early cases they are almost always absent. Dr. Chadwick, in examining the chest of 2,828 tuberculous patients, before history and x-ray were taken, found himself correct in only 24 per cent of the cases, in finding change of breath sounds. Dr. Mark found that 50 per cent of cavity cases had no physical signs to be discovered by the stethoscope. If even those who are specialists in chest diseases find breath sounds unreliable in the great majority of cases, how misleading they will be in the hands of the general practitioners, is not hard to imagine.

Value of Rales. We often do listen for rales in diagnosing tuberculosis. When definite rales are present, they surely mean some pathology, but *their absence should never be interpreted as absence of tuberculosis.* In Trudeau Sanatorium, of 280 minimal cases studied by chest specialists, only 27 per cent had apical rales, that are more diagnostic than those found in other parts of the chest; in the 111 minimal cases of Vermont group only 20 per cent had apical rales. In other words, if the absence of rales meant absence of tuberculosis, then three out of four or more minimal cases in these groups would have been missed, even by the experts.

Tuberculin Test. *This test, if correctly done and carefully interpreted, is one of our most sensitive tests in finding people who have living tubercle bacilli or their products in their bodies—not in the chest alone, but any part of the anatomy.* In other words, a definitely positive tuberculin test indicates that the person surely has come in contact with an active tuberculosis case sometime in his life, but it has no value in diagnosing a case to be actively tuberculous, as we understand this term. It is true that all active tuberculous cases, excepting some of the terminal cases and also under some other conditions, are tuberculin positive, but the opposite is not true; that is, all tuberculin positive cases are not actively tuberculous chest cases. In the minds of many doctors, the harboring of small amounts of living tubercle bacilli and hence with a positive tuberculin test, is rather good and means protection in most human beings. It is true that there are some leading physicians who do not accept this viewpoint, but if it did not afford some type of protection, it would be hard to explain why only one or, at the most, two per cent of definitely tuberculin positive persons do develop active pulmonary tuberculosis, and why 98 per cent or more of these positive reactors get along in life without developing active tuberculous disease. The most important roles of the tuberculin test are, I believe, when it is positive before the first year of life, and when it is definitely negative in a suspected active tuberculous case in early stages. In the first group, we can always suspect a massive infection and active tuberculous dis-

ease; in the second group, we can reasonably be assured that the signs or symptoms that the patient has are not due to tuberculosis but are of non-tuberculous origin.

Sedimentation test. This test is not of great value in finding tuberculous cases, in early or late stages, because it is a non-specific test. If sedimentation is definitely increased or fast, it surely means some type of pathology that has caused a definite change in the body chemistry. We have found it rather useful in collapsed lung cases, due to pneumothorax or thoracoplasty, in whom the x-ray may not show the condition of the lesions, but a change of sedimentation rate indicates improvement or advance of the disease.

Sputum examination. This test, if properly done, is one of our most reliable means for diagnosing an active tuberculous case, but unfortunately it is not as reliable in early cases as it is in advanced stages. But we recommend it highly for its simplicity and for its reliability in a great percentage of cases. It can be performed by any doctor himself or may easily be done for him. It takes very little time and effort and if positive it is conclusive in almost 99 per cent (not to say 100 per cent) of cases, in diagnosing active tuberculosis. But before we report any sputum to be negative, the examination should be repeated at least ten times on different days, and the sputum should be at least a twenty-four hour specimen or more, if the expectoration is of small amount. If we add culturing and inoculation methods with these samples, our negative or positive results will be of more value, of course. In the group of 280 minimal cases at Trudeau Sanatorium, only 25 per cent had positive sputum. In the group of 111 minimal cases of Vermont group, only 14 per cent had positive sputum. Of even the advanced cases, in these studies, only 61 and 66 per cent had positive sputum, respectively. There is no doubt that the culturing and inoculation of guinea pigs with the sputum would definitely raise the number of positive cases.

The latest addition in this line is the stomach washing and smear, culture and inoculation of the wash material to find acid-fast bacilli. In a group of 700 converted sputum cases, negative for nine months, stomach washings were positive in 60 per cent of cases. We can easily conclude that smear, culture and inoculation of sputum and stomach washings are some of our most reliable laboratory tests, that will reveal early, as also advanced tuberculous cases often not found by other means.

X-ray of chest. Here is a laboratory procedure that is one of our most reliable, if not the only reliable means of finding early tuberculosis. In the Trudeau group of 280 minimal cases, 99 per cent showed x-ray evidence of the disease and in the Vermont 111 minimal group, 100 per cent had the x-ray evidence. Here is a reliable procedure that was and still is in smaller communities rather expensive and not accessible to many doctors, but gradually it is becoming more and more available in reasonable cost almost to all of us. Once we doctors are sold on its merit, we can very easily make it available to all of our patients with moderate cost. In large cities, like Detroit, no doctor needs to diagnose a chest case without an x-ray, because it is available to all who need it, for a nominal fee or gratis. Many cities and counties

at present are helping their citizens to get such a chest x-ray with a reasonable fee or free, and it is up to the doctor to avail himself of this opportunity. In those places where doctors do not have this facility they can very easily arrange for a common x-ray machine for the profession. They need only to be convinced that x-raying of the chests is the most reliable means to find early, as well as advanced tuberculosis. *No patient of ours should be told that he is free from tuberculosis unless a good chest film is taken and interpreted to be negative by an experienced chest or x-ray man.*

CONCLUSIONS

1. If we are going to diagnose early tuberculosis, we shall have tuberculosis in mind first of all, when a patient complains of fatigue or tiredness, cough that has lasted more than two weeks, chest pains, abdominal symptoms or dyspepsia, loss of weight and hemoptysis.

2. We should become more and more skeptical about our ability to diagnose an early, or even an advanced case, of tuberculosis by our stethoscope alone. We can depend more on a contact history, on a carefully taken temperature and pulse record, if possible, than on our stethoscope. Let us use our stethoscope less and other means more to find tuberculosis in any stage.

3. We should do more and more sputum examinations, when the question of tuberculosis is concerned. Culture and guinea pig inoculations of sputum and stomach washing examinations are surely very dependable means to find acid-fast bacilli that generally mean active pulmonary tuberculosis.

4. Nowadays a chest x-ray is our most valuable aid in diagnosing early and advanced tuberculosis. In the majority of cases, one flat chest film is all that is needed. Very few cases do need a stereo film. Never tell your patient that he has no tuberculosis, unless you have a chest film taken and interpreted by an experienced doctor.

5. As the early cases of tuberculosis are mostly symptomless, we doctors should go after our patients to find those cases and not wait for the patients to come to us. A general practitioner will help his clientele a great deal if he encourages them to have all known contacts x-rayed, off and on. If the patient is not able to pay for this service, we have to ask the aid of the city, the county or the state or we doctors should have our common x-ray machine to do this work, with a reasonable cost to our patients. Let us decide to x-ray as many healthy people as possible, up to the age of 25 or more, and we shall find more and more cases of early tuberculosis.

Diagnosis and Treatment of Tuberculosis

W. L. Meyer, M.D.

Sanator, South Dakota

DR. MIHRAN has very ably discussed the history, symptoms, and physical findings in pulmonary tuberculosis. I wish to discuss the diagnosis and treatment of tuberculosis.

First, the Mantoux Test. This test will show only whether or not there has ever been an active tuberculosis present. There are a number of facts that must be remembered in the interpretation of this test. The material must be freshly prepared and it must be injected into the layers of the skin. If the first strength is negative (using double strength P.P.D.), the second strength must be used before the test can be considered negative. If the test is negative, it means that the person has not had tuberculosis. A true negative test is almost 100 per cent reliable. If the test is positive, it means that at some time or another, the individual has had a tuberculous infection. It does not tell whether or not the infection is active at this time, nor if it is in the lung or in some other organ of the body.

Physical examinations in pulmonary tuberculosis are not reliable. It is impossible to detect every case of minimal pulmonary tuberculosis. It is possible to have a minimal pulmonary tuberculosis, and even cavity formation, that does not present any physical signs. If the physical examination reveals the presence of abnormal breath tones, posttussic rales, whispered pectoriloquy, or any other signs that indicate a pulmonary tuberculosis, we are able to make a diagnosis. But even if none of these signs is present, and we have reason to suspect

pathology from the history and subjective symptoms, we cannot say the chest is normal.

The x-ray is one of the most accurate methods of detecting pulmonary tuberculosis. It is possible that there may be a small infiltration behind the heart that does not show up on the film. Lateral and oblique films, if taken, will show this. The x-ray reveals many minimal infiltrations that are not detectable on physical examination. Stereo chest films are much more reliable than the single flat films and should be resorted to if there is any question of diagnosis. The planograph and other methods of taking pictures of sections of the chest are more clearly able to outline cavities than even stereo plates.

Tubercle Bacilli. One certain proof of tuberculosis is the finding of the tubercle bacillus. Sputum samples should always be run. One single negative sample is not sufficient. At least ten forty-eight-hour specimens should be secured and concentrated. If tubercle bacilli are found, they are proof of tuberculosis. If they are not found, we cannot be certain that tuberculosis is not present. About 20 per cent of the moderately advanced cases and about 50 per cent of the minimal cases of tuberculosis do not have a positive sputum. The absence of tubercle bacilli does not eliminate tuberculosis. Blood counts, sedimentation rates, and other laboratory findings merely indicate that possibly some kind of infection is present. These tests do not determine the type of infection and will not locate it.

A very detailed history is essential. There are a num-

ber of other conditions affecting the lungs that demand consideration. A detailed history will not eliminate any of them but will point further study toward or away from the diagnosis of tuberculosis. It must be remembered that tuberculosis affects other organs than the lungs. It is necessary to detect any signs that might indicate involvement of other organs that will require treatment concurrently with the pulmonary disease.

TREATMENT

Rest is one of the most important things in the treatment of pulmonary tuberculosis. By rest we mean complete bed rest, twenty-four hours a day and seven days a week. Every move that the patient makes that someone can make for him is work and should be avoided. Every bit of work that the patient does, increases the length of time that he will have to spend to cure his tuberculosis. Sitting up, talking, laughing, writing letters, etc., all constitute more work for the patient and the lungs. However, it must be remembered that physical rest must be sacrificed sometimes for mental rest, and some type of activity, such as reading or hand work of some kind is allowed.

Food is essential in the treatment of tuberculosis. It is not advisable to stuff the patient with rich food. A balanced diet containing the necessary vitamins, minerals, carbohydrates, fats, and proteins, is all that is essential. Too much gastrointestinal disturbance has been encountered by attempting to increase the patient's weight with rich foods.

Sanatorium treatment. It is desirable that the patient be in a sanatorium. Here, all the patients are more or less on the same physical level. The atmosphere is more conducive to curing tuberculosis than is that of a private home. It is rather difficult for patients to remain consistently in bed at home for a period of a year or eighteen months. As soon as they feel well and are temperature-free, with a slight gain in weight, they begin to feel that they should be out of bed and not have anyone waiting on them. Some of their friends, meaning well,

will persuade them that they are well enough to stay up during the evening for a game of cards. This may be a good way to pass an evening but the tubercle bacilli are not vacationing while the patient is playing cards.

At this time experiments are being carried out to perfect a chemical that may be used for the treatment of tuberculosis. Some very satisfactory results have been secured. So far this drug has not been placed on the market. It is probable that there will be a marked change in the treatment of tuberculosis within a short time with this drug, some modification of it, or even an entirely new one.

Rest remains the most important element in the treatment of tuberculosis. There are a number of *surgical procedures* that are used but they assist mainly in putting the lung at rest. A few of these procedures and their aims are as follows:

A phrenic merely allows the lung to collapse. It is necessary that the lung heal itself.

A pneumothorax allows added rest and if a cavity is present, may allow the walls of the cavity to come in apposition so that the lung will heal.

A pneumonolysis will free the adhesions between the lung and the chest wall so that a clinically unsatisfactory pneumothorax may be satisfactory and allow the lung more rest.

An extrapleural pneumothorax or an extrapleural paraffin pack will allow more rest.

Thoracoplasty operations allow the lung more rest and the walls of the cavity to come in apposition.

A lobectomy or pneumonectomy with complete removal of the diseased focus, more clearly approaches the appendectomy in which the diseased tissue is removed in toto and at once.

In a tuberculous tracheobronchitis, bronchoscopic examinations and treatment with silver nitrate in concentration of 20 to 30 per cent, have produced favorable results. The electrocautery and ultraviolet light have been used through the bronchoscope but with less favorable results.

The Use of Miniature X-ray Films in Tuberculosis Control*

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THE greatest demonstration in history, of the prevalence of tuberculosis in this country, has taken place since the onset of the present war. One recruit out of every one hundred has been rejected because of tuberculosis found through x-ray examinations at induction centers. Recently, similar case-finding surveys have been extended to the employees in war industries and to individuals in "critical areas," and a similar incidence of this disease has been noted in our civilian population.

*Presented before the North Dakota State Medical Association at Bismarck, on May 11, 1943.

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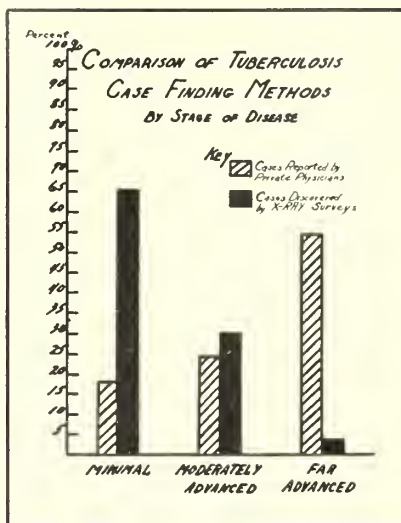
That the x-ray examination of the chest is the most accurate method of detecting tuberculosis and the only way of finding the early cases, has now been universally accepted.

The standard 14"x 17" x-ray film has been unanimously considered to present the most accurate roentgenological record. However, it is too costly to yield itself for use on a large scale. To meet the needs of rapid examination at a minimum cost, photofluorography has come to the rescue. This method utilizes small film (4"x 5", 35 millimeter, and recently 46 millimeter film has been added). The extensive use of the small film



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technic by the United States Army, Navy, and the U. S. Public Health Service, has proved it to be a valuable weapon in the fight against tuberculosis.

Tuberculosis has shown a steady decline during the last century, but as in all wars, the disease is again on the increase in most countries engaged in the present world combat. Reports, although unofficial, indicate that tuberculosis has increased one hundred per cent on the continent of Europe since the outbreak of war. Britain acknowledges this disease to be a major war-time public health problem, the annual number of deaths from tuberculosis in England having risen 13 per cent during the short period from 1938 to 1941. A significant rise is particularly noted in the mortality rate from tuberculous meningitis among children.

An increased incidence of tuberculosis in the United States has not as yet been demonstrated, although figures from certain war work areas are not reassuring. An increase in the tuberculosis mortality rate in this country, however, may be expected, unless we emphasize our case-finding and treatment program.

In January, 1942, there was established in the States Relations Division of the U. S. Public Health Service, a section of Tuberculosis Control. The purpose of creating a tuberculosis control section was to build a program to prevent, if possible, the expected war-time rise in tuberculosis death rates in this country. The Census Bureau studied the problem and found that the proportion of tuberculosis deaths to deaths from all causes was higher in the "critical war work areas," both urban and rural, than in the "non-critical areas." Unfavorable environment, such as over-crowding, unsanitary living conditions, and undue fatigue, were striking contributing factors.

Because of these findings and because of the importance of protecting essential war workers from the white plague, it was decided to concentrate tuberculosis control

efforts in the critical areas. The following specific measures were set forth in the objectives by the U. S. Public Health Service:‡

"1. Widespread chest x-ray examination of workers, and development of tuberculosis control programs in war industries.

2. Chest x-ray examinations and follow-up medical services for families in war industry communities, and especially for minority and underprivileged groups.

3. Extension of the chest x-ray examination procedures of the Army and Navy to Coast Guard recruits and seamen of the Merchant Marine.

4. Elaboration of a workable system, in cooperation with Selective Service and the armed services, for immediate reporting to state and city health departments of all recruits rejected because of tuberculosis. This would result in full advantage being taken of the case-finding being done by the medical corps of the armed forces. In March, 1942, there was unsatisfactory reporting of rejectees in 21 of the 48 states.

5. Tuberculosis consultation service to state health departments upon request, with a view to rapid inventory and reorganization of control programs on a war-time basis. (a) Plan for coordination of the efforts of official and voluntary agencies on a state level, to avoid duplication and to concentrate power. (b) Accumulate current information on basic needs of each state, so that a framework can be formed upon which to build a sound structure for tuberculosis control when the emergency is over."

At the present time, the U. S. Public Health Service has 10 miniature x-ray photofluorographic units on loan to state and city health departments, for operation in war industries and "war work areas". Two of these units are 4"x 5", and eight are the 35 millimeter type.

In filling requests for service, preference is given, in assigning the units, to the larger essential industries, where workers can be examined on a mass basis. Valuable time is consumed in setting-up and dismantling the equipment for moving, hence the smaller plants are given less consideration. The small film units are loaned to state health departments for limited periods of time, to demonstrate their value for case-finding surveys. Through this service, the Kansas State Board of Health obtained a 35 millimeter photofluorographic unit from the U. S. Public Health Service. This unit began operation on a part-time basis in the middle of July, 1942, and since the latter part of September, 1942, the unit has been in full-time operation, except for a few weeks, when a mechanical break-down occurred.

The Kansas Tuberculosis and Health Association contributed substantial financial assistance toward the operation of the unit. This has helped greatly, because only limited funds were available from the state health department.

A survey staff consists of a medical officer to read the miniature films (in the case of Kansas this is the Director of the Tuberculosis Control Division of the Board of Health), an x-ray technician, and a supervisory nurse. The industry or group to be surveyed furnishes clerical assistance.

‡Published in *Diseases of the Chest*, May-June, 1943, "The Tuberculosis Control Program of the U. S. Public Health Service."

The equipment consists of a condenser discharge apparatus with a capacity of one-half microfarad and a voltage range up to 90 K.V.P. This type of apparatus has the advantage of operating on a 110 volt alternating current line. The size of the focal spot of the tube is approximately 3 millimeters. The focal spot-screen distance is 40 inches, and the exposure time approximately 1/15 second. The photographic equipment consists of a camera with a coated 1.5 lens and utilizes 35 millimeter green sensitized film. The apparatus is transportable in a truck. The unit is dismantled for transportation, and can be reassembled in an hour.

The 35 millimeter photofluorographic technic is chosen over other methods, where large numbers are to be examined with limited funds. The U. S. Public Health Service has demonstrated that less than 10 per cent of the minimal lesions are missed by this method, and that advanced lesions are detected as accurately as with large-sized films.

From an epidemiological point of view, if all advanced, and 90 per cent of all minimal cases could be discovered and adequately treated, the eradication of tuberculosis would be relatively simple. With limited funds, it is of greater value to x-ray 100,000 persons with small films and miss a few minimal cases, than to x-ray one-tenth of this number with the more accurate but, also, more costly conventional method. The latter method leaves 90,000 individuals without the benefit of any x-ray examination whatsoever. An additional advantage in the use of the 35 millimeter films in mass survey work at this time, is the fact that one team can take, develop, and interpret 500 films per day. This is fully twice the number of large films that could be handled per day by the same personnel. Because of the shortage of skilled workers, this is an important factor in the selection of the method.

Hilleboe's tabulation of the first 194,896 x-rays, made by eight units operating in eleven states, revealed a total of 1,631 individuals, or 1.3 per cent of the total examined, with significant pulmonary tuberculosis. Our findings are not unlike those of the combined statistics of all units, except for a slightly lower rate of occurrence of tuberculosis in our state. This is in keeping with the fact that Kansas has a lower tuberculosis mortality rate than the states in which the other seven units operated.

Of the first 21,427 individuals surveyed in war industries and in the so-called "critical areas" in Kansas the following findings were revealed:

Number x-rayed	21,427
§Cases of tuberculosis or suspicious for tuberculosis	171 or .8%
Other nontuberculous chest pathology	105 or .5%
Total cases with pathology referred to private physicians	276 or 1.3%
§Definite reinfection tuberculosis	103 or .5%

One hundred seventy-one (0.8 per cent) were found to have tuberculosis or were suspicious for tuberculosis. An additional 105 cases of non-tuberculous significant pathology were found, making a total of 276 (1.3 per cent) cases with chest pathology who were referred to their family physicians for further examination, advice, and treatment. Diagnoses were based on the interpreta-

tions of 14"x 17" films which were made subsequent to the preliminary 35 millimeter screening.

The distribution of cases is of interest, in that the ratio of minimal to advanced cases is the reverse of that of the cases that come to the attention of the health department through the usual channels.

Minimal	68 or 66%
Moderately advanced	31 or 30%
Far advanced	4 or 4%

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All individuals x-rayed receive personal reports. Inasmuch as education occupies an important part in the objective of these surveys, an added effort is made to demonstrate to the public the value of preventive medicine.

With this in mind, we have incorporated in each report a statement urging the individual to report to his physician periodically for a physical and x-ray examination.

Those with significant pathological findings receive reports advising them to see their family physicians as to further advice, care, and treatment. The final diagnosis and disposition of each case is left entirely to the private physician. Upon completion of study of the patient, the physician returns a medical report to the office of tuberculosis control, indicating what examinations have been made, the final diagnosis, and recommended disposition.

In industry, all employees are allowed to continue employment until the status of their disease is fully ascertained. Those in whom the disease is found to be inactive are allowed to continue work under medical supervision, and are required to report for regular examination, including x-rays and sputum studies. Occasionally, a change in the type of work is indicated. Those with active or progressive disease, or those found to have positive sputum, are provided immediately with isolation and treatment.

SUMMARY

Recent chest x-ray surveys have brought to light one case of significant pulmonary tuberculosis in every one hundred recruits examined by Selective Service. Similar findings have been demonstrated among war workers and families in war work communities in eleven states. These are the findings of one photofluorographic unit loaned by the U. S. Public Health Service to the state of Kansas. Through the x-ray examination of the first 21,427 apparently healthy individuals in war industries and persons in the so-called "critical areas" in Kansas, more than one out of every one hundred is found to have significant unrecognized chest pathology, including one out of every 200 found to have unrecognized pulmonary tuberculosis.

The ultimate eradication of tuberculosis depends upon the widespread acceptance and application of the modern concept that tuberculosis must be seen, not felt or heard; seen on an x-ray film, not felt by the patient, or heard with a stethoscope. This implies the routine x-ray examination of all patients entering a physician's office, all hospital admissions, and finally the periodic roentgenological screening of all individuals. Photofluorography is a practical method for attaining this objective.

A Review of 84 Cases of Pleural Fluid

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THIS is a review of 84 consecutive cases of pleural fluid treated by us at the North Dakota State Tuberculosis Sanatorium. Some of the cases were admitted with pleural fluid. Others developed this condition as a complication of the treatment of pulmonary tuberculosis. Only male patients were treated, and the period of time which this review covers is twenty-eight months. Some of the cases were known at the onset to have been non-tuberculous, and were admitted for diagnosis as well as treatment. In some cases, pulmonary lesions were considered to be too active for collapse therapy and yet, because of the tremendous amount of pathology present in the lungs, collapse therapy was instituted, in spite of the knowledge that pleural effusion and probably empyema were almost inevitable. It was hoped that collapse therapy, even for a relatively short period of time, would improve the lesions in the lungs and reduce the toxicity.

ETIOLOGY

The determining factors in the etiologies of these pleural effusions are listed as follows:

1. Complication of pneumothorax (this is by far the most common cause of pleural fluid)—33 cases.
2. Pleural effusion as a primary condition—20 cases.
3. Fluid complicating the operation of closed pneumonolysis—7 cases.
4. Postoperative results of thoracoplasty done over pneumothoraces—3 cases.
5. Postpneumococcus pneumonia empyema—2 cases.
6. Fluid, following the introduction of oleothorax—3 cases.
7. Fluid, as a complication of bronchopleural fistula—3 cases.
8. Pleural effusion which developed without pneumothorax, as the pulmonary disease became more extensive—2 cases.
9. Pleural fluid, as a result of cardiac decompensation—4 cases. (All the cases expired within two months of admission.)
10. Lung abscesses associated with bronchogenic carcinoma draining into the intrapleural space—1 case.
11. Spontaneous pneumothorax with fluid—2 cases.
12. Complication of lung abscess—1 case.
13. Fluid which formed after the abandonment of pneumothorax with consequent re-expansion of the lung—2 cases.
14. Mistaken aspiration of pleural effusion diagnosed by x-ray (diaphragmatic hernia)—1 case.

BACTERIOLOGY

The type of bacteriological work done in the laboratory varied during the twenty-eight months because of changes in facilities. Most of the fluids were subjected to direct smears, cultures, and guinea pig inoculation for tubercle bacilli. If the fluids were cloudy or purulent,

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blood agar plates were made, to demonstrate secondary invaders. The summary of the laboratory results is as follows:

Of 68 cases in which the pleural effusion was of undoubted tuberculous origin, 39 were so proved by laboratory procedures which included stained smears, cultures and guinea pig inoculations. In 29 cases, however, the tubercle bacillus could not be demonstrated in the fluid. In other words, 57 per cent of the cases, which were diagnosed as tuberculosis by clinical and laboratory procedures, gave rise to pleural fluids in which the acid-fast bacilli could not be demonstrated. The bacteria found in mixed tuberculous pleural fluids were found to be the staphylococcus albus, the staphylococcus aureus and the streptococcus haemolyticus. Pneumococcus and streptococcus albus occurred alone in empyemas of non-tuberculous origin. Sporotrichotic studies were also done in certain of the cases.

DISCUSSION OF ILLUSTRATIVE CASES

Case 1. The patient was admitted as a case of pulmonary tuberculosis, moderately advanced. The sputum was positive. Artificial pneumothorax on the left was instituted. Pleural effusion developed four months later. This fluid was aspirated on repeated occasions and, following each aspiration, the intrapleural pressure was adjusted. The patient was discharged six months later as an arrested case of pulmonary tuberculosis. The sputum was negative. No fluid was present.

Comment: This case demonstrates the usual course when the pleural fluid is incidental and does not interfere with the treatment instituted.

Case 2. The patient was admitted as a case of pulmonary tuberculosis, moderately advanced. The sputum was negative. Pneumothorax was instituted on the left. Seven months later pleural effusion on the left developed. This was treated by aspirations, and the left lung was partially re-expanded. At this point, pleural effusion developed on the right and this was also aspirated. In cases of bilateral effusion, it is a routine procedure to begin frequent examinations of the urine. Any urine which contains many white blood cells and yet no bacteria is subjected to guinea pig inoculation. This is done even though no albumin may be present in the routine urinalysis. Therefore, the urine in this case was watched closely and in a short while the urine was found to contain numerous white blood cells with no accompanying bacteria. The guinea pig inoculation of the urine was positive for tubercle bacilli, and retrograde pyelograms showed findings characteristic of left lower calyx ulcers. At no time did the patients have any complaints referable to the renal system. Nephrectomy was advised and carried out.

Case 3. The patient was admitted with a diagnosis of left tuberculous empyema. This condition was controlled by aspirations and antiseptic irrigations. During the sanatorium stay, tuberculosis of the right knee developed.

Comment: Cases 2 and 3 demonstrate the intimate relation between pleural effusions, especially bilateral, and the later development of pathology in the bones and kidneys. From our point of view, we regard every pleural effusion as being related to spread by the lymphatics or blood stream and, therefore, it is logical to us that, in these cases of pleural effusion, foci in other parts of the body develop.

Case 4. The patient was admitted as a case of pulmonary tuberculosis, far advanced. The sputum was heavily positive. Soon after admission, frequent massive hemorrhages from the left side developed. Artificial pneumothorax was instituted as an emergency measure, and this controlled the hemorrhages. Two months later, pleural effusion developed on the left and was treated by aspiration. Although the patient's sputum is still positive, a marked clinical improvement has occurred. At a later date, complete thoracoplasty on the left side will have to be done.

Comment: In the above case it was known with almost complete certainty that a pleural effusion could be expected if artificial pneumothorax was instituted. However, because of the massive pulmonary hemorrhages, pneumothorax was begun and did stop the hemorrhages. In spite of the fact that the fluid formed as anticipated, the patient has shown a marked clinical improvement.

Case 5. The patient was admitted with a diagnosis of pulmonary tuberculosis, far advanced, arrested, with right pneumothorax. One week previously there was the acute onset of a right pleural effusion. This condition could not be controlled and, therefore, the patient was admitted to the sanatorium for treatment of the effusion. The patient was acutely ill and the first aspiration yielded 1350 cc. of yellow clear fluid. One week later the fluid became purulent. Repeated aspirations were done and following each aspiration, there was a profuse irrigation with azochloramid saline solution. Because the laboratory reported a profuse growth of staphylococcus aureus, the injection of 5 per cent sulfanilamide in saline was done intrapleurally. In ten days the fluid changed from purulent to clear in character. This remained clear as long as the sulfanilamide was injected and became purulent if this treatment was omitted. An eleven rib complete thoracoplasty was done in six stages.‡ At the present time the patient still has his pleural effusion. He has been aspirated 186 times and, at the present time, his treatment consists of aspirations twice weekly. At each aspiration there is a profuse irrigation with azochloramid saline solution until the return is clear. Sulfathiazole suspension in saline is now being injected intrapleurally. In spite of the many aspirations, there is no skin infection present.

Case 6. The patient was admitted with a diagnosis of pulmonary tuberculosis, far advanced. X-ray demonstrated a cavity just above the left diaphragm. Artificial pneumothorax on the left was instituted but was not sufficiently effective. Therefore, left temporary phrenicectomy was done. Soon afterwards, pleural effusion developed, and became persistent. At this point the pneumothorax was converted to an oleothorax. Two weeks later a bronchopleural fistula with a massive mixed empyema developed, and all of the oil was removed. At

each aspiration site, there was a chest wall infection. Sulfathiazole solution was now injected intrapleurally and, in one week's time, the fluid became clear and the aspiration site where sulfathiazole injection had been used remained clear. The patient is now working six hours daily, his sputum is negative and only a small amount of clear pleural fluid remains.

Comment: Cases 5 and 6 clearly demonstrate the value of intrapleural injection of either sulfanilamide or sulfathiazole solutions intrapleurally in the treatment of mixed empyemas. Also, as has been shown by us repeatedly since, injection of a small amount of sulfanilamide or sulfathiazole through the needle tract area usually prevents infections of the skin.

Case 7. The patient was readmitted to the sanatorium one year ago with the diagnosis of a mixed empyema. Rib resection had been done and a tube inserted prior to the patient's admission. Treatment at the present time is the re-institution of the tube through the old wound and daily antiseptic irrigations. Complete thoracoplasty will be necessary.

Comment: It has been our experience that, when a tube is introduced in cases of pure tuberculous effusion or empyema, one immediately converts the previously uncomplicated tuberculous effusion into the very dangerous mixed empyema.

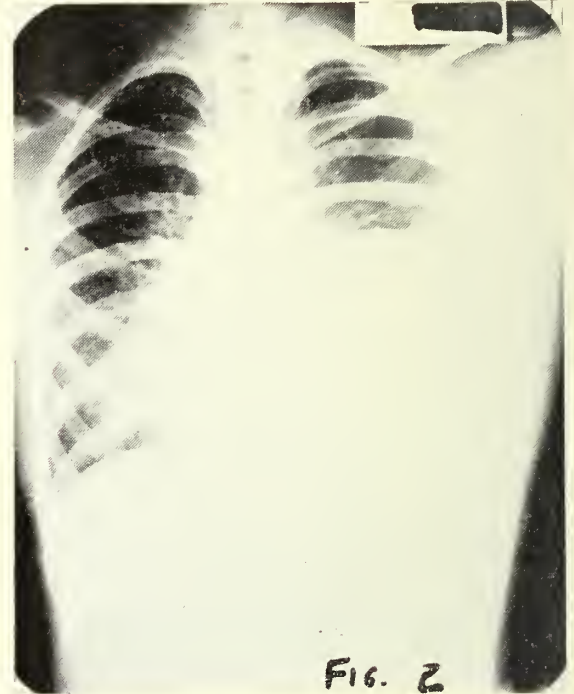
Case 8. The patient was admitted with a diagnosis of pyogenic empyema with bronchopleural fistula. The patient was extremely toxic, very dyspneic and in extremely bad shape. The laboratory found the fluid to contain staphylococcus albus and many gram-positive diplococci. A catheter tube was inserted and sulfathiazole solution was instilled. In 58 hours the fluid changed from purulent to serous in character. The clinical condition improved immediately. The patient was later discharged to a general hospital for further treatment.

Case 9. The patient was admitted with a diagnosis of pleural effusion on the left and pulmonary tuberculosis, minimal. The fluid on the left was aspirated repeatedly and air was replaced into the intrapleural space. In two months time the fluid changed from clear to purulent and the patient became extremely toxic. Blood agar plates demonstrated secondary invaders of the staphylococcus group. Although frequent aspirations always left the patient without fluid, his clinical condition became worse, he developed a tuberculous meningitis and expired.

Comment: In cases of persistent mixed empyemas it is best to institute surgical collapse as soon as the condition of the patient warrants it.

Case 10. The patient was admitted with a diagnosis of pulmonary tuberculosis, far advanced, arrested, with a right artificial pneumothorax. The persistence of intrapleural fluid led to the introduction of oleothorax. However, the fluid still persisted and the oleothorax was abandoned. A ten rib complete thoracoplasty was done in five stages (Fig. 1). The fluid is absent and the patient has no complaints.

Comment: When pleural fluid persists after a reasonable trial with medical treatment, the treatment of choice seems to be that of complete thoracoplasty, especially where there is also an underlying parenchymal condition.



Case 11. The patient was referred here for treatment of a left empyema. A few cubic centimeters of bloody fluid had been aspirated previously. Bronchoscopy was non-contributory. On attempted aspiration, a few cubic centimeters of blood were obtained. Because we could not locate the diaphragm with certainty, a barium meal was given to the patient, and it was seen that the small intestine had knifed its way through the left diaphragm into the thorax and that the stomach was located deep in the pelvis (Fig. 2). The patient was referred to others for operation.

Comment: This is a very unusual case of diaphragmatic hernia which by x-ray was diagnosed as pleural effusion. Although rare, this possibility should always be kept in mind in the differential diagnosis of pleural effusion.

Case 12. The patient was admitted as a case of pulmonary tuberculosis, moderately advanced. There was a right pneumothorax present and the sputum was positive. Clinically, the patient showed all the findings of a pneumococcus lobar pneumonia. There was fluid present in the right intrapleural space. This fluid was aspirated and was found to be clear. The x-ray showed a right lower lobe pneumonia of the collapsed lung. Sulfadiazine treatment was instituted and the high temperature, fever and cough receded in seventy-two hours. Two weeks later the x-ray showed complete resolution of the lower lobe consolidation.

Comment: This case demonstrates that lobar pneumonia of pneumococcus origin can and does occur in collapsed lungs (Fig. 3).

COMPLETE WORKUP IN CASES

Every case of pleural effusion deserves a complete diagnostic workup. This should include a complete history

†Dr. W. L. Wallbank performed the chest surgery.



and physical examination and an adequate x-ray. The pleural effusion should be subjected to stained smears, cultures, and guinea pig inoculations. Whenever bronchoscopy is indicated, it should be done. At all times there should be a careful check of the osseous and renal systems.

COMPLICATIONS OF PLEURAL FLUID

The complications of pleural fluid in this series of cases are: (1) empyema, (2) secondary focus in the kidney, (3) secondary focus in the bones, (4) skin infections of the chest wall, (5) bronchopleural fistula, (6) tuberculous meningitis.

TREATMENT

We will not attempt to discuss the treatment of pleural effusion in detail. In this series of cases the treatment has been as follows:

1. The aspiration with needle and syringe and replacement of air as indicated.
2. The institution of oleothorax.
3. Rib resection and institution of catheter drainage in non-tuberculous empyemas.
4. The injection of sulfanilamide and sulfathiazole solutions in mixed empyemas.
5. The profuse irrigations with azochloramid saline solution and the instillation of sodium tetradecyl sulfate 7 per cent solution (more commonly known as azo-turgical). The azo-turgical is supposed to have for its func-

tion the lowering of the surface tension of the fluid on the visceral pleura.

6. Complete thoracoplasties in cases of persistent tuberculous fluids, and also in mixed empyemas.
7. In older patients with pleural effusion, the replacement of air following aspiration must be done with extreme caution.

SUMMARY

1. Eighty-four cases of pleural fluid have been reviewed.
2. Fifty-seven per cent of the cases which were diagnosed as tuberculosis by clinical and laboratory procedures gave rise to pleural fluids in which acid-fast bacilli could not be demonstrated.
3. Twelve cases were discussed to emphasize the problem of treatment.
4. The complications of pleural fluid in this series were: (1) empyema, (2) secondary foci in the kidneys and bones, (3) chest wall infections, (4) bronchopleural fistula, and (5) tuberculous meningitis.
5. The treatment of pleural effusions was briefly discussed.

Tuberculosis Among College Students

*Thirteenth Annual Report of the Tuberculosis Committee American Student Health Association for the Academic Year 1942-43**

DURING the academic year 1942-43 a majority of our colleges and universities felt the impact produced by a nation at war. Student Health departments have naturally been compelled to make many readjustments during the past two years. At many institutions the health program for students has been rather drastically curtailed. In many instances, medical staffs have been reduced to such an extent that various types of special studies have necessarily been reduced in scope or even abandoned. This period of enforced entrenchment will quite obviously be responsible for diminishing returns in the field of research.

Prospects for the immediate future appear none too bright. Recent announcements by various departments of our federal government seem to indicate that large numbers of trainees will soon be withdrawn from the many colleges participating in the Army Specialized Training Program. Discontinuance of this support, under present conditions, may actually threaten the survival of some of our smaller institutions. This is especially true of certain men's colleges and those institutions having a limited enrollment of women students.

With such highly unfavorable conditions prevailing, a considerable number of colleges have found it impossible to continue their tuberculosis case-finding programs. At certain other schools excellent programs have been maintained, but the number of students surveyed has fallen well below the level of previous years. Women's colleges

have, for the most part, continued in a manner quite comparable to their high standards of pre-war years.

The last annual report of the Committee showed an all-time high of 311 institutions reported programs of tuberculosis control for the school year 1941-42. In view of existing conditions, we feel that this year's showing is indeed quite favorable. With 267 colleges indicating that case-finding programs were conducted during 1942-43, this represents a reduction of approximately 14 per cent. A similar percentage decrease is noted in the number of replies reaching the Committee in response to the questionnaire mailed to 879 colleges. Forty-five per cent of the institutions contacted in this manner filed reports outlining their activities. This is a very poor record indeed. It is quite possible that among the 481 colleges concerning whom we have no information for the current year, there may be at least a few of this number which may be sponsoring some type of case-finding procedure.

Table 1 presents a summary of reports filed and programs reported by institutions, with location by states and various geographical areas. It will be noted that a higher proportion of colleges in the midwestern and Pacific coast areas provide programs of tuberculosis control than in other sections of the country. In some of the southern and southwestern states only 10 per cent of the colleges provide such a program. Among the individual states having ten or more accredited colleges, Minnesota again presents the best record with 76 per cent of its institutions having tuberculosis programs. For the

*Presented at the twenty-third annual meeting of the American Student Health Association, Hotel Gibson, Cincinnati, Ohio, March 15-16, 1944.

country as a whole only 30 per cent of colleges sponsored such activities during the past year.

TUBERCULIN TESTING PROGRAMS

It is encouraging to find that 208 colleges, representing a total student enrollment of 300,144, have been able to continue their tuberculin testing routines. Since 59 of the colleges presented incomplete data concerning testing methods, the results here recorded are based on the reports of 149 colleges having a total enrollment of approximately 244,527 students. Among 44,341 men students tested, 7,541, or 17.0 per cent, were reported as positive reactors. Tests for women students numbered 41,768, with 6,057, or 14.5 per cent, giving positive reactions. Among a total of 86,109 students of both sexes tested, therefore, there were 15.7 per cent who gave positive tuberculin reactions. In view of this relatively low incidence of tuberculous infection among college students, it should be pointed out that testing procedures and dosage employed are by no means uniform at the many colleges reporting testing programs. However, if we consider the results obtained at those colleges employing what may be considered an adequate dosage of tuberculin, 51 in number, we find that of 42,107 students so tested, positive reactions were obtained in 18.6 per cent. This compares with an incidence of 21.8 per cent positive reactions reported by a similar group of colleges a year ago. It is worthy of emphasis, we believe, that 13 colleges of this latter group report less than 10 per cent of positive reactors among their students. The majority of these institutions are located in the midwestern and northwestern states. Previous reports by this Committee have called attention to the rather significant and steady decline in the incidence of tuberculous infection observed among college students during recent years. Yet in spite of all the evidence produced by college groups and others, relating to this phase of the tuberculosis problem, it is apparent from communications reaching this Committee that some physicians still believe that the majority of all young adults have been infected with tubercle bacilli. When we realize that the death rate from tuberculosis in the United States has declined approximately 79 per cent since 1900, it seems quite obvious that the percentage of persons now becoming infected with tubercle bacilli should be considerably lower than when the disease was much more prevalent. Another factor contributing to the lowered incidence of infection among children and young adults is the high degree of success achieved during the past few years in the program of eradication of tuberculosis in cattle. With every state in the Union having gained a modified accredited rating and with only about one-fourth of one per cent of all animals now known to be infected, infection of humans from bovine sources is undoubtedly occurring very infrequently. Probably a considerable number of students entering our universities at this time developed sensitivity to tuberculin as a result of infection with the bovine type of bacillus. Whatever this number may be, it should become less with each succeeding year and practically reach the vanishing point in about ten years hence.

NEW CASES OF TUBERCULOSIS

The value of the group or mass survey of apparently well persons is very evidently becoming more generally recognized. Certainly it offers the most direct as well as the most effective means for the early diagnosis of tuberculosis. It is most encouraging to note the large number of industrial and other organizations which are now conducting chest x-ray surveys among their entire personnel. The United States Public Health Service, through its Division of Tuberculosis Control, has carried on extensive tuberculosis surveys among industrial groups during the past two years. They announced quite recently that they now have on file requests to x-ray one million war workers. There is no doubt but that the routine use of the chest x-ray as part of the induction examination for men of the armed forces has provided considerable impetus for more widespread use of this procedure. American colleges and universities may well take pride in having been probably the first nationally organized group to sponsor this type of tuberculosis control program.

Although 44 fewer colleges reported case-finding programs in 1942-43 than in the previous year, many departments have indicated that they expect to be able to resume activities within a year or two. Table 4 summarizes the results of tuberculosis case-finding programs as reported by 267 institutions. Total student enrollment at these colleges is 406,626. At 59 of these schools the tuberculin test is not employed as a screening procedure preliminary to x-raying. The remainder, however, 208 in number, follow the more usual practice of tuberculin testing followed by chest x-rays for the positive reactors.

There were 522 new student cases of tuberculosis diagnosed at these schools during the past year. This is a rate of 128.3 new cases of the disease per 100,000 enrolled students. In addition 31 new cases of tuberculosis were discovered among food handlers and 42 cases among faculty members, administrative personnel and employees. There were 131 colleges which filed reports indicating that they have no organized program of tuberculosis case-finding. With an enrollment of 90,670 students, these institutions reported two new cases of tuberculosis discovered during the year.

Although the questionnaire and report form now in use by the Committee does not ask that the stage of the disease be specified in each new case of tuberculosis diagnosed, no doubt the majority of students found by routine survey to have the disease, present early, incipient lesions. In most of these early cases, regardless of the stability of the disease process, symptoms are usually absent. During the past year, 169 students withdrew from college to undergo treatment for tuberculosis, 101 being reported as entering sanatoria. Of probably greater significance is the fact that 302 students returned to college having undergone treatment for tuberculosis discovered in previous years. Although we have no available data indicating the percentage of students who resume college activities following leave of absence because of tuberculosis, we have reason to believe that it is very high. Early diagnosis, made possible through repeated x-ray examination, coupled with early and adequate treatment of those found to have the disease, has reduced to a minimum the devastating effects of tuberculosis among

students at many of our colleges and universities. It is unfortunate that 70 per cent of our institutions made practically no provision for the early detection or control of tuberculosis among their students during the past year.

ACTIVE OR INACTIVE DISEASE

The Committee is somewhat concerned about the possible dangers involved in attempting to classify newly discovered cases of tuberculosis as active or inactive. It is apparent from the reports filed by colleges where new cases of tuberculosis have been discovered during the year, that there seems to be no hesitancy in designating all cases as in one or the other of these groups. Of the 522 new cases reported this year by some 267 colleges, 168 were classed as active and 354 as inactive. It would be of considerable interest to know whether the dividing line between "active" and "inactive" was based on the appearance of the lesion on the x-ray film, the presence or absence of symptoms or a combination of these and other considerations. Since 354 of these young men and women were considered to have tuberculosis in an "inactive" form, representing two-thirds of all new cases reported, what disposition was made of their cases? How frequently should they be examined and over how long a period should they be under observation? These and other pertinent questions arise if we are to give proper consideration to the safety of such a group of individuals.

The term "inactive" should have no place in classifying or in describing the status of any case of tuberculosis. The Committee suggests that the term "quiescent" be used in accordance with the following definition by the Committee on Diagnostic Standards of the National Tuberculosis Association: "No constitutional symptoms. Sputum, if any, may or may not contain tubercle bacilli. Lesions stationary or retrogressive according to x-ray examination; cavity may or may not be present. These conditions to have existed for at least two months." In this same committee's consideration of the "active" case, they show preference for the term "unstable" which they define as follows: "Symptoms unchanged, worse or less severe, but not completely abated. Lesions not completely healed; may be progressive according to x-ray examination. Sputum almost always contains tubercle bacilli."

When a young person of college age is found to have tuberculosis, the question of treatment should naturally be given careful consideration. Numerous letters come to the Committee inquiring about the necessity of treating those cases with minimal lesions who present no symptoms and no abnormal chest findings. Needless to say, we cannot offer any set of rules or suggest standards which might be of the slightest value in passing judgment in such cases. Each and every individual case should be given the advantage of careful study by the most experienced and expert person available. We should like to emphasize that in young persons of college age the great majority of tuberculous lesions of the lung parenchyma are definitely dangerous and unstable. Treatment, therefore, is indicated in most of these cases if

best results are to be obtained. Entire absence of symptoms, normal sedimentation rate and sharply defined borders of a small nodular density in the lung parenchyma, as shown on the x-ray film, are no guarantee of the stability of a tuberculous process. Many of us have seen these small, apparently innocuous lesions remain latent or quiescent for several years and then suddenly progress in a most explosive fashion. This has occurred not infrequently in persons who were kept under close supervision, including frequent chest films, and who were on markedly restricted activities. Since there were 169 students who withdrew from college to undergo treatment for tuberculosis, among a total of 522 newly discovered cases, we wonder if the number given the advantage of prompt treatment, 32.3 per cent, is as high as it probably should have been. It would seem advisable that the 353 students allowed to continue their college work should be kept under close supervision, with probably the majority of these having serial x-ray films at intervals of two to four months.

In looking toward the future we believe there is a quite general feeling of optimism among workers in this field. Numerous letters have come to this Committee recently indicating that some colleges are planning to organize student health programs for the first time, while others contemplate an expansion of their present activities. The Committee wishes to acknowledge again the valuable assistance being rendered by the National Tuberculosis Association. We have recently been assured by Dr. Kendall Emerson, Managing Director, that the Association is prepared to co-operate in every way possible in our work of further developing the program of tuberculosis control among college students. Working through State Tuberculosis Associations, it is planned to meet with representatives of colleges where tuberculosis programs have never been instituted. It is believed that only in this way can we learn of the various obstacles confronting these institutions, and it is hoped that with the co-operation of various agencies, these may be largely overcome. We are convinced that in organization and in practice our colleges and universities should establish a pattern of tuberculosis control which might well serve as a model for other groups throughout the nation.

SUMMARY

The incidence of tuberculous infection among college students, tested with adequate dosage of tuberculin, is 18.6 per cent.

At 13 colleges and universities, located in midwestern and northwestern states, less than 10 per cent of students give positive reactions to tuberculin.

Five hundred and twenty-two new cases of tuberculosis were diagnosed last year at 267 colleges which conduct tuberculosis case-finding programs.

During the academic year 1942-43, 169 students withdrew from college to undergo treatment for tuberculosis. During the same period, 302 students resumed their college activities having previously been on leave of absence because of this disease.

TABLE 1
Questionnaire Survey of Tuberculosis Case-Finding in American Colleges and Universities, 1942-43

	Institutions Contacted	Replies Received	Programs Reported
Maine	8	3	3
New Hampshire	7	1	1
Vermont	6	1	1
Massachusetts	44	20	13
Rhode Island	5	3	3
Connecticut	12	6	3
	82	34	24
New York	67	24	19
Pennsylvania	64	31	16
New Jersey	19	17	11
Delaware	1	0	—
Maryland	17	6	4
District of Columbia	9	3	2
	177	81	52
Virginia	18	11	8
North Carolina	22	9	6
South Carolina	15	5	4
Georgia	16	3	3
Florida	7	3	2
	78	31	23
Oklahoma	16	6	2
Arkansas	11	1	1
Tennessee	28	6	2
Mississippi	9	6	4
Alabama	13	1	0
Louisiana	12	3	2
Texas	31	4	1
	120	27	12
North Dakota	9	2	2
South Dakota	8	2	2
Minnesota	21	17	16
Wisconsin	27	22	14
Michigan	25	20	12
Ohio	46	35	21
West Virginia	14	10	7
Indiana	27	16	12
Illinois	44	18	15
Iowa	26	8	4
Nebraska	16	5	3
Kansas	21	10	8
Missouri	27	13	6
Kentucky	17	5	4
	328	183	126
Montana	6	1	1
Idaho	3	1	1
Wyoming	1	1	1
Nevada	1	1	1
Utah	4	0	—
Colorado	9	9	4
Arizona	3	1	0
New Mexico	5	0	—
	32	14	8
Washington	16	5	5
Oregon	11	8	5
California	35	15	12
	62	28	22
Grand Total	879	398 (45.2%)	267

TABLE 2
Testing Technics in 208 Colleges Reporting Tuberculin Testing Programs, 1942-43

Testing Method:	
Mantoux intradermal	140
Vollmer patch test	50
Pirquet	1
Combination Patch and Mantoux test	3
Unspecified	14
Testing Material:	
Purified Protein Derivative	73
Old Tuberculin	64
Unspecified	21
Testing Dosage:	
Two-dose technic	38
Single large dose	31
Single intermediate dose	33
Single small dose	35
Combination of dosages	1
Unspecified	20
Testing Routine:	
New students and all negative reactors annually	50
New students only (no retesting)	46
New students and all seniors	29
Test optional (available to all annually)	33
Other testing routines	26
Unspecified	24

TABLE 3
X-Ray Procedures Reported by Various Institutions, 1942-43

208 Colleges Reporting Tuberculin Testing Program:	
Positive reactors x-rayed once	65
Positive reactors x-rayed annually (or oftener)	61
X-ray optional (acceptance general)	35
X-ray optional (acceptance not satisfactory)	5
Other x-ray routines	14
Fluoroscope used routinely to supplement x-ray	36
Fluoroscope used exclusively (chest x-ray when indicated)	7
59 Colleges Reporting No Tuberculin Testing Program:	
Chest x-ray for all new students	20
Chest x-ray for all students annually	12
Other routine x-ray programs	19
Routine not reported	8

TABLE 4
New Cases of Pulmonary Tuberculosis Diagnosed Among College Students, 1942-43

Institutions with SOME Organized Tuberculosis Program:	
No. of clinically active cases diagnosed	168
No. of clinically inactive cases diagnosed	354
Total new cases reported	522
No. of students who left college because of tuberculosis	164
No. of institutions reporting	267
Approximate total enrollment	406,626
New cases per 100,000 students	128.3
Institutions with NO Organized Tuberculosis Program:	
No. of clinically active cases diagnosed	2
Total new cases reported	2
No. of students who left college because of tuberculosis	5
No. of institutions reporting	131
Approximate total enrollment	90,670
New cases per 100,000 students	2.21
Total Cases of Pulmonary Tuberculosis Diagnosed 1942-43:	
Student cases newly diagnosed	524
Food-handlers	31
Faculty, administrative officers, etc.	43
Total, new cases	598

TABLE 5
Enrollment of Institutions Cooperating in Tuberculosis Survey 1942-43

Enrollment:	Number of Schools	
	1941-1942	1942-43
Less than 500 students	222	198
500 to 999 students	118	94
1,000 to 1,999 students	71	46
2,000 to 2,999 students	18	20
3,000 to 3,999 students	16	11
4,000 to 4,999 students	6	8
5,000 students and over	33	21
Enrollment not given or listed	4	—
Total Schools	488	398
Total student enrollment	703,369	497,296

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Failure to Detect All Tuberculosis on Induction to Military Service

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IN the April issue of the *JOURNAL-LANCET DOCTOR* Emerson states that already 5,000 persons have been discharged from military service with tuberculosis. To many persons this statement will be shocking as they believed the x-ray of the chest to be wholly dependable in detecting all tuberculosis, and, hence, that everyone admitted to the service was free from this disease. Now, everywhere the question is being asked, "Where did the failure occur?" The answer is obvious: (1) Approximately the first million persons admitted under selective service received about the same kind of examination for tuberculosis as did those who entered World War I. Thus, there were admitted those who already had gross lesions, some of which were destined to become contagious and cause illness. Up to this point we did not profit one iota from the experience of World War I or from the large volume of information which had been produced from other sources.

(2) After approximately one million persons had been inducted, x-ray inspection of the chest was added to the examination. This already had been done in other countries of both the allied and axis powers. Indeed, this addition guaranteed the best examination for pulmonary tuberculosis that had ever been given during any war. It was known that if the best known films were properly exposed and carefully inspected, a high percentage of persons with gross pulmonary tuberculosis could be rejected for service. The first error was introduced, however, in the decision against the use of 14 x 17 inch x-rays, the method known to be the best and most efficient of all. For them photofluorograms were substituted. These consist of 4 x 5 inch films and 35 x 35 millimeter films exposed from images on the fluoroscopic screen. Although adequate comparative studies between these and regular size x-rays previously had shown the photofluorograms to be less accurate, such factors as ease of filing and storing and lower cost were allowed to outweigh the all-important factor of accuracy; therefore, the Army adopted the 4 x 5 inch and the Navy the 35 x 35 mm. photofluorogram. Thus, at the outset it was a foregone conclusion that many cases of clinical pulmonary tuberculosis would pass through this wide-meshed screen undetected.

In 1942, Pendergrass, et al., reported on a comparison of stereoscopic miniature chest films, single roentgenograms on paper and on celluloid, made on the chests of the same individuals. They were viewed by thirty-one persons who had considerable experience in chest diseases for comparison and rating. Using the 14 x 17 inch roentgenograms on celluloid as 100 per cent, these physicians voted the 14 x 17 inch paper roentgenogram as 97 per cent; the 4 x 5 inch photofluorogram as 91 per cent; and the 35 mm. photofluorogram as 79 per cent. The same year Hilleboe, et al., reported on the use of 35 mm. pho-

tofluorograms among the mentally ill and pointed out that 11.4 per cent of minimal and 4.1 per cent of the moderately advanced cases which were found on 14 x 17 inch films were missed by the photofluorogram. It would appear, therefore, that instead of making a regular size x-ray of the chest of those persons whose photofluorograms reveal shadows as is usually done, it should be imperative to make such exposures of all whose photofluorograms appear clear if one were to detect as many lesions as possible by x-ray.

Even if 14 x 17 inch x-rays had been used as a part of every examination, much significant tuberculosis would have been missed. This screen has such a coarse mesh that all lesions pass through it undetected except those which are gross, and even some of them "squeeze" through. From 70 to 80 per cent of the persons with primary lesions are entirely missed by x-ray. Twenty-five per cent of the lung is not even visualized on the usual single x-ray film; therefore, all lesions which lie in these parts are obscured from view by shadows of other organs and are missed even though they belong to the reinfection type.

A clear x-ray of the chest does not rule out pulmonary tuberculosis in any sense of the word. Many persons with such films have reinfection type of lesions evolving which are still beneath the range of unaided human vision. Every clinician who has had a wide experience in the diagnosis of pulmonary tuberculosis knows that persons with clear films of the chest today may have evidence of definite lesions revealed on films taken three to six months later. No provision was made for such persons who were inducted into the service.

Every experienced clinician knows that if two or three persons, independent of one another, read the same group of x-rays, there will often be disagreement of interpretation in as many as 25 per cent; even when these same persons view the films together, they will still disagree on a considerable percentage of them. This is because they are not dealing with an exact science. They are using a method which involves only unaided vision. No two persons have the same judgment or experience. Some attempt the impossible, such as determining microscopic etiology by a macroscopic method, or determining the activity of a lesion from one inspection of its shadow, or determining whether a given lesion belongs to the first infection or the reinfection type.

When chronic tuberculous lesions attain such size and consistency that they begin to absorb x-rays, the changes on the film are so slight that one cannot be certain whether a lesion exists. Doubtless many persons with lesions in this stage of evolution were inducted. A few years ago the medical profession was lured into believing that rales or other abnormal physical signs could always be elicited over an area of pulmonary tuberculosis. The

ridiculousness of that conception is now obvious. When it was shown that tuberculous lesions over which no rales can be heard often cast x-ray shadows, the profession was lured into believing that all tuberculosis can be detected by the x-ray. The ridiculousness of such a belief has long been recognized by many clinicians, and it is now being demonstrated on a large scale among those in military service who, on induction, were declared free from tuberculosis on the basis of the x-ray.

(3) The student of tuberculosis demands far more information than the x-ray film of the chest can afford. He wants to know which of the men and women in service have living tubercle bacilli in their bodies. This information is readily obtained by the delicate, specific, and highly accurate tuberculin test. With well-known exceptions, everyone who reacts characteristically to tuberculin has living tubercle bacilli in the body. Nothing but tubercle bacilli cause clinical tuberculous lesions. Therefore, every tuberculin reactor at the moment has such lesions or has all of the "makings" for their development. On the other hand, with well-known exceptions, everyone who does not react to the tuberculin test does not have living tubercle bacilli in the body.

This information is of such extreme importance that everywhere the question is being asked why it was not made available for every person in the service. The question is particularly pertinent, since a biological test which requires far more effort and is less accurate was performed on every inductee for syphilis, a disease far less prevalent than tuberculosis. The most likely answer to the question is that those in authority at the time the decision was made were laboring under the erroneous belief that nearly all adults are infected with tubercle bacilli and hence would react to tuberculin. In all probability not more than 25 per cent of those under 25 years of age now in service, and a slightly higher percentage of those beyond this age, would react to tuberculin, or would have at the time of induction. While the incidence of tuberculin reactors in this age period is higher than 25 per cent in a few places, it is markedly lower in many places. Indeed, there are now many entire counties in this country where not more than 5 to 10 per cent of the 18-year-old girls and boys are infected with tubercle bacilli. In fact, among 73,000 college and university students tested in all sections of the United States in 1941 and 1942, only 21.8 per cent reacted to tuberculin. In 1943, 86,109 students were tested and approximately 16 per cent reacted.

At the moment of induction every infected person had foci of living tubercle bacilli in the body. X-ray inspection probably screened out most of those with gross parenchymal lesions, but this was a small percentage of the infected who were destined to have such lesions appear at some later time. In other words, some of those with lesions too small or of a consistency that did not cast shadows visible on the x-ray film, were destined to have clinical lesions evolve to such proportions as to cause illness, contagion, and death. These lesions would have evolved if the individuals had remained in civilian life. Indeed, it is from just such persons that we annually harvest a crop of clinical tuberculosis, a fact long since

established by periodic examination of tuberculin reactors over a decade or more.

The significant point is that if all infected individuals had been recognized when they entered military service their number would have been so small that they could have been kept under close surveillance throughout the war and thereafter, so most of those who develop clinical tuberculosis would have had it detected while minimal and non-contagious. The fact that the infected individuals have not been kept under close observation, including frequent x-ray films of their chests, is in all probability an important factor in the present unpleasant situation.

What of the remaining 75 per cent, that is, the non-reactors to tuberculin? *First*, a small percentage, but, in the aggregate a large number, of individuals could have been spared much mental anguish. These persons had non-tuberculous lesions whose shadows were misinterpreted as tuberculous because those who erred did not know that they were not even infected with tubercle bacilli. *Second*, there is a belief, substantiated only by flimsy evidence, to the effect that persons who attain adulthood uninfected with tubercle bacilli are in a hazardous position if they are then exposed and infected. We have observed approximately 1200 persons who became tuberculin reactors in adult life but have failed to see any more frequent or serious lesions develop in them than among those infected earlier in life. The present war offered the greatest opportunity of all time to test this subject on a gigantic scale to the advantage of the armed forces. A large number of our uninfected military men and women have entered countries where they are being exposed to both human and bovine types of tubercle bacilli. The periodic testing of these persons with tuberculin and close observation of those who became reactors could afford invaluable information which would point the way to better control.

In the absence of tuberculin testing no one knows whether a given individual was a non-reactor who became infected in service or was infected before entering service. Unless such information is available no one should hazard the opinion that persons fall ill because they have been spared infection until adulthood. *Third*, both during and after the war, it is tremendously important to know something of the government's responsibility for tuberculosis among individuals seeking compensation. The government should not have the same responsibility for the person who entered as a reactor as for the one who became infected in line of duty.

While we have failed to some degree, the situation could be much more serious. It must be repeated that the best examinations have been given for tuberculosis in all the history of war. The present unfortunate tuberculosis situation in our armed forces is due largely to: (a) failure to inspect the chest by x-ray of approximately one million persons who were first admitted; (b) adoption of photofluorograms, which are less efficient than the regular 14 x 17 inch x-rays, either on celluloid or on paper base; (c) overestimation of the physician's ability to detect the presence of tuberculosis even by the best x-ray methods; (d) failure to recognize the physician's inability to determine microscopic etiology and ac-

tivity of lesions from x-ray shadows; (e) failure to employ the most important of all diagnostic procedures, namely, the tuberculin test, which would have screened out with uncanny accuracy all inductees who were potential cases of clinical tuberculosis; (f) failure to periodically retest with tuberculin all who were non-reactors on induction; (g) failure to make periodic x-ray film inspection of the chests of all who entered the service as reactors, as well as those who became reactors in service. Although these failures have occurred, we must not at this moment be too critical, as those who were originally authorized to prepare and recommend procedures may have been handicapped by such factors as lack of facilities, too little time for complete examinations, and even inadequate knowledge of tuberculosis to effect an ideal tuberculosis control program. While mild or even no criticism is justified at this time, we now know that certain errors have occurred, and if we fail to profit by them throughout the war and thereafter, we shall be deserving of the most severe criticism.

During World War I a few physicians, particularly Dunham, of Cincinnati, maintained that every inductee should have x-ray film inspection of the chest. Although their advice was not accepted, time proved the correctness of their recommendation. Following that war our government spent huge sums of money providing hospitalization and treatment for many whose disease could

have been detected by x-ray film inspection of the chest before induction.

After World War I, it was clearly demonstrated that the best method of controlling tuberculosis among civilians consists of finding, isolating, and treating contagious cases, and examining periodically, always including x-ray film inspection of the chest, all adult tuberculin reactors. When this is done, most chronic pulmonary tuberculosis lesions can be detected before they cause illness or become contagious and can then be treated successfully.

Apparently these facts had not been adequately impressed on the minds of the medical profession before the present war began, and the catastrophe that is now being observed among military persons, as well as civilians, should impress upon the minds of the medical profession and the public as a whole the toll of tuberculous infection. During this war a demonstration is being made on what might be considered a gigantic scale. However, it only involves to date approximately 15 million persons examined for military service and a few million engaged in the war industries. After the war we shall have those discharged from military service, as well as those retained in the service, plus the entire remainder of our population to whom the procedures here outlined must be applied if we are satisfactorily to control tuberculosis.

History of Practical Chest Roentgen Photography 35 mm. Film Method

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THE history of applied roentgen-photography, also spoken of as fluoro-photography, fluorography, miniature x-ray film or photofluoroscopic chest examination, originated with the photographing of the fluoroscopic image of the chest at the clinics of Manoel De Abreu at San Paulo and Rio de Janeiro. Alert to the role of mass radiography in preventive tuberculosis, he stressed the advantage of low-cost examinations and constructed an apparatus based on the works of Cole and Leven (U.S.A.) and Comodon (France) in their trials with roentgen-cinematography.

De Abreu's first "Thoracic Census Centre" was installed at Rio de Janeiro in 1936-37 and employed a Contax or Leica camera, fluorescent screen and roentgen tube conjoined. The cost of film was twenty cents, producing twenty-three prints per meter, making the raw film cost less than one cent for each exposure. De Abreu utilized the following technic: Camera lens speed, 1:1.5; tube-screen distance, 60 cm.; milliamperage, 50; penetration, 85 kvp.; interpretation, 3 to 4D enlargement. His experience justified the conclusions that roentgen-photography is actually documented roentgenoscopy, not replacing teleo-roentgenography with its enhanced detail, contrast, etc., but nevertheless permitting wider applica-

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tion through lesser cost. De Breu, was therefore, the true exponent of miniature film methods in mass roentgenography.

The author, in 1937, had the opportunity for first-hand investigation and study of diagnostic clinics in routine operation at Rio de Janeiro at a time when the miniature film method was being simultaneously used at Hamburg, Buenos Aires, etc. As a result of this experience a duplicate apparatus was constructed and it was noted that the fundamental factors which influence contrast, detail and density were applicable to this method just as in the conventional roentgenogram. In 1938, suggested modifications of technic for roentgen-photography which appeared to enhance accuracy of interpretation were introduced. The modified technic included the use of a tube with rotating anode, 100-500 milliamperes and kilovoltage as the variable factor dependent upon patient calibration. In agreement with De Breu, it was found that gross projection apparatus enlargement was less satisfactory, due to film grain, than simple magnification.

Our own conclusion was that the method of roentgen-photography that utilizes apparatus and film for 35 mm. technics was definitely superior to fluoroscopy since it

permits permanence of record and opportunity for more deliberate interpretation—yet a note of qualification was sounded in the statement that the 35 mm. method should be employed only when chest x-ray film surveys, for financial reasons, could not otherwise be made.

More recently in this country mass surveys have utilized 14"x 17" paper roentgenograms, 4"x 5" and 35 mm. miniature films (roentgen-photography). Prominently concerned with the development of these methods have been Edwards and Myers (14"x 17" paper); Douglas, Birkelo, Bridge, Potter, and Tice (4"x 5" film); Hilleboe, Tice, and the author (35 mm. film.)

The literature from the Continent again suggests a pioneering advantage in the 35 mm. miniature film method. The entire population of German Gau Mecklenburg was examined by this method (640,000 persons) with "sufficiently exact diagnosis." Their interpretations were made with projection apparatus.

At Buenos Aires, after an experience with 100,000 miniature (35 mm.) films, the suggestion was made for centralization of interpretation.

The first Varrier-Jones lecture on the subject "The Early Diagnosis of Tuberculosis" cites the experiences with miniature (35 mm. films) roentgen-photography of 40,119 members of the Air Force, including women of the auxiliary service, at seven times the speed of the "full ones."

Tice, reporting on tuberculin testing in Chicago schools, compared routine filming by conventional x-ray film methods (at \$450 per case found) with mobile x-ray miniature film units, and arrived at the conclusion that the miniature film method of diagnosis has stepped up to first place as a case-finding instrument.

Hilleboe and Morgan have operated a photofluorographic unit in the Washington, D. C., area including approximately 15,000 examinations, adding a photo-electric cell exposure control device (phototimer) developed by Morgan. They observed a marked improvement in film quality, and a reduction of interpretation fatigue.

The Bureau of Medicine and Surgery, U. S. Navy, has recently equipped trucks for photofluoroscopic chest examinations in connection with the V-12 Navy College Training Program for medical and dental students.

The combined experiences, civilian and military, with the 35 mm. miniature film method, have suggested no

advantages, other than economic, over other survey methods which combine accuracy of interpretation with their increased cost. The "Supreme Court" in chest roentgenography in individual interpretation continues to be the 14"x 17" celluloid roentgenogram, though acknowledging definite values and need for other roentgenographic and roentgenoscopic methods.

EDITOR'S NOTE: Frederick Tice in *A Century of Tuberculosis in Illinois*, 1940, refers to the author's experiences and contributions to this field: "In the State, and indeed in the country, Dr. D. O. N. Lindberg of Decatur is the pioneer in this miniature x-ray work. Over two years ago the writer read of Abreu's work in South America in a foreign journal and on January 14, 1938, wrote asking further information. The letter, for some reason, was never answered. Doctor Lindberg was more insistent and direct. He went to South America, worked with Abreu and brought back what there was to be known about this new art of fluorography. Though the present interest in the miniatures and the developments along this line stem largely from his efforts, Doctor Lindberg, like many another pioneer, to date has received comparatively little credit. As the interest mounts and as the potentialities of this new medium become more fully apparent, this lack of appreciation will undoubtedly be rectified.

Doctor Lindberg, from the start, was dissatisfied with the inch square film and advocated a 4"x 5". His suggestions were taken up by one of the large industrial firms and fluorographic units are now being turned out."

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VOLUNTEER ARMY TO FIGHT FLU IS STARTED IN BRITAIN

The Minister of Health has issued a circular to all District Councils throughout Great Britain, calling on them for a total mobilization of health visitors, school nurses, first aid post and rest center staff members, the Women's Voluntary Services, and youth organizations to combat the flu epidemic. Already the British Red Cross, St. John's and W.V.S. have offered full services.

This flu, accompanied by a temperature, seems to be virulent for about four days and then leaves the patient feeling very debilitated. It would not be so serious in normal times, but the country is mobilized to the last man—and woman—so that when a housewife falls ill, there is no one to hold the fort, no one to do the shop-

ping or look after the patient. District nurses are already worked off their feet with their regular calls.

Instructions for dealing with the epidemic have been received from Sir Wilson Jameson, Chief Medical Officer. Pools of helpers under local medical officers' direction will nurse, visit, and help with household work, for it is most important that the housewife does not get up before she is well enough to carry on her home duties. The helpers will do the cooking and cleaning and look after the children, and attend flu victims living alone. Meals are sent in from British restaurants on a cash and carry basis, also from school canteens, etc. This method of dealing with the situation through volunteers and any workers available, which is typical of Britain's fully mobilized effort, has been working well.

Problems, Opportunities and Obligations Confronting Health Educators*

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PEOPLE must be taught the values of health and the dangers of disease, shown what facilities are available to protect their own and others' health and influenced to translate that knowledge into action.

During wartime the health educator, hard pressed like all his colleagues in related fields of medical and social service, may find himself sighing for the less complicated days of peace. His experience should warn him that peace is no more a mere absence of conflict than health, positively viewed, is a mere absence of disease.

However, deprived of trained personnel, both because of its diversion to military pursuits and because of dwindling sources of supply, the health educator feels the pinch of manpower shortage. Material aids on which he traditionally depends are apt to fail him in varying degree. Difficulties range all the way from acute paper shortage that limits his effective supply of printed matter up to uncertainty about obtaining such essential items as motion picture equipment. The very practical problem of how to transport himself and his teaching impedimenta over the frequently far-flung expanses of his constituency, not always easy of solution, has become increasingly difficult.

And so the puzzled health educator may not see the forest because of the trees; he may not realize until too late that his wartime audience was particularly receptive to health information, peculiarly anxious to cooperate, unusually well able, financially, to do so. It is a mistake, too, to forget that peacetime is often notable for its content of human apathy and indifference, that peacetime budgets are sometimes as shrunken as today's volume of manpower and that postwar problems will call for as great a display of ingenuity as any that challenge us at present.

Probably what we need is not merely "postwar planning," about which we now hear so much, nor prolonging the emergency measures which were forced upon us by suddenly conspiring circumstances. The call is for a re-examination and reconstruction of our program, the elimination of all that is outmoded, the adaptation of sound fundamentals to conform to altering conditions, the incorporation of sufficient flexibility to promise that we can absorb coming shocks with a minimum of dislocation between plan and performance. Both the front office and the customers want to know the details of our new model in health education.

QUALIFICATIONS

Before we proceed to a discussion of the special aspects of health education in the field of the tuberculosis worker, let us recall that health educators are simply teachers specifically trained to carry on the presentation of one segment of a rounded educational whole. Just as a successful teacher of science must know and keep re-learn-

ing his subject thoroughly, believe in its importance, be accomplished in the technics of presenting it to a wide range of ages, interests and abilities and never falter publicly in his personal application of the principles he expounds, so must the health educator be master of his craft. Ideally, the health educator possesses a love for people as individuals, not merely an urge to "do good" on a gross scale. Practically, to make this ideal operative, he must be a rare combination of teacher, showman and psychologist as well as having the dual ability to assume the role of leader or play the part of servant among those he would influence. *Education is not a point to be arrived at, but a continuous, living process to be pursued.* Therefore, the best educators are those who remain acutely conscious of their own need for more and still more education, who make sure that need is satisfied and who retain the responsiveness and adaptability necessary to render their output acceptable to the least susceptible of their contacts.

THE INDIVIDUAL, NOT THE MASS

Tuberculosis is just as capable of spreading today from an open case to an innocent bystander as ever it was. Tuberculosis is just as able as ever to mask its presence in the human body until late stages of the disease usher in a manifestation of symptoms. Tuberculosis, if unhindered by proper counter measures, can bring suffering, illness and death to young and old alike now even as in past years. The disease has not changed. Men, accumulating knowledge and applying it, have succeeded in changing the total tuberculosis threat and the overall tuberculosis picture. The weakness in the attitude of some educators seems to stem from a proneness to think and teach in terms of the mass rather than with regard to the individuals making up that mass. We issue solemn warnings that about 58,000 deaths from tuberculosis still occur annually in the United States, missing the obvious fact that to the public this is too large a consideration for immediate digestion and application.

As others have pointed out, let me reiterate that Mr. Average Citizen thinks mainly about himself, his intimate family circle, his usually small quota of friends and acquaintances. Let someone he knows die from tuberculosis, let his or some nearby family go through the heartbreak and economic disaster accompanying it, and then his unaided imagination will multiply that preventable, unnecessary tragedy until he grasps the terrifying implication of the national figures. Since we cannot arrange for and do not want this kind of personal object lesson to be the lot of the so far unconvinced, health educators must make their message so individual, plain and compelling that it penetrates beyond the mind and into the heart of everyone. Health educators will succeed in this endeavor only when they have humanized their statistics and personalized their advice. Mass edu-

*Address delivered before annual meeting of Louisiana Tuberculosis Association, New Orleans, Louisiana, April 17, 1944.

†Director, Health Education, National Tuberculosis Association.

cation has served the herded Axis nations well, but Americans believe so strongly in individual prerogatives that they fight and die to maintain them.

CHANGING EMPHASES

The shifting age-specific death rates for tuberculosis have raised serious questions for health educators and clinicians alike. Undoubtedly much of the lessening tuberculosis morbidity and mortality among children and young people is traceable to improved methods of early diagnosis, more effective segregation of infectious cases, more adequate treatment and more thorough rehabilitation of patients, virtual elimination of the threat of infected milk supplies and a system of health education that is beginning to bear fruit. However, with the emphasis being rapidly removed from case finding in the relatively unproductive ranks of youth and placed instead on the unexpectedly productive decades of older ages, there has loomed the coincident danger that youth may, as a result, be neglected. This is a two-fold menace. In the first place, even the comparatively rare case that exists among young people deserves to be given every possible chance for prompt diagnosis and adequate treatment and the advantages these confer. Secondly, the health educator cannot afford to have millions of young Americans reach maturity and enter the demonstrated more hazardous later years lacking the facts about tuberculosis, lacking the conditioned willingness to respond to diagnostic procedures when they are offered, perhaps bearing in the bodies of many of them the pre-clinical beginnings of the very disease whose belated ravages are now indicated as rising curves on mortality graphs after youth is left behind.

GETTING UP TO DATE

While on the subject of lifting our barrage so as to concentrate on new objectives, it should be apparent to every health educator that, in the middle and older age groups now demonstrated to be reservoirs of tuberculous infectivity as well as sources of startlingly large numbers of tuberculosis deaths, there is a great and neglected field for adult health education. Somehow these people grew up knowing few if any significant facts about tuberculosis. Now it is necessary to secure their cooperation in the screening process by which public health authorities hope to comb their ranks and find the numerous undiscovered cases. It is equally imperative that they be taught they are menaces to all about them as it is for them to realize that treatment still holds considerable hope of rendering them safe, productive members of society again. It is obvious that we shall have to experiment with educational devices that have succeeded among younger groups before we can expect to develop modified or new methods that will impress and instruct people long since out of the years when learning came easily. It will be infinitely difficult to teach these older folk new tricks, but that makes the job the more intriguing.

ACTIONS PLUS WORDS

A further word of caution concerns the tendency to conduct examinations, again with too much regard for

mass results, on a preponderantly mechanistic basis. Americans applaud assembly-line methods because they represent savings of time, effort, money and materials. However, the manufacturer of the most impersonally assembled gadget or machine insists on an advertising campaign that promises the maximum demand for his product and usually provides printed instructions that help the buyer to use and understand to full advantage what he has bought. Any mass radiographic program, therefore, will be most popular when intensive educational preparation, both long-range, and short-term, has preceded it. But that is only part of the secret. It will succeed only if every participant is convinced that it is schemed for him as an individual, if he is treated with courtesy and consideration, if the findings are simply and carefully explained to him, if there is adequate follow-up of the suspicious film by all the many clinical procedures that are necessary to make a diagnosis instead of a guess, if there are provisions for positive action in every case where trouble actually is discovered. The team charged with setting up the apparatus, securing the pictures, reading the films, may lack the time and opportunity to carry on an appropriate educational pre-filming and post-filming campaign. But the health educator must assume full responsibility for his portion of the program, obtaining an invitation in those instances where, through oversight or misguided attempts at haste, he has not been asked to perform his essential function. Any preventively intended diagnostic procedure, to be successful, must be repeated at intervals. The acceptance of the repetition by those whom it is meant to protect will depend, primarily, on each individual's recollection of previous contact with a safety measure he understood and appreciated.

SPECIAL PROBLEMS

A concomitant part of a tuberculosis case-finding program that directs its maximum energies at those areas, racial, social and geographic, where most tuberculosis is known to exist must be an educational assault on every factor that tends to produce these aggregations of tuberculosis. For example, it has been well substantiated that tuberculosis represents a greater problem among our Negro population than among whites. This has not been shown to be due to special susceptibility on the part of the Negro, or to specific failure of his tissues to fight the disease. The crowded and insanitary conditions under which a great part of our Negro citizens live are responsible for facilitating the spread of the bacilli that cause tuberculosis. That explains the relatively large number of cases. So, too, the admittedly poorer educational facilities that are the lot of considerable portions of the Negro community operate to keep many Negroes from knowing the facts about tuberculosis, how it can be discovered early, how it must be handled, how the family is to be protected. All such disadvantages combine to swell the particularly high death rate due to tuberculosis among Negroes.

It thus becomes apparent that a tremendous obligation rests upon the health educator at this point. Property owners and civic authorities who control the lives and destinies of their fellow citizens must be educated to

realize that degrading, unhealthful housing, deficient schooling, inadequate dietary, substandard medical facilities or any other remediable factors favoring tuberculosis and threatening human life and welfare do not belong in a country pledged to life, liberty and equal rights for all. This education of the higher-ups must be accompanied by a thorough program of health instruction as part of an enhanced system of general education among Negroes, Spanish-speaking groups, American Indians or any other part of our population known to harbor more than its share of residual tuberculosis.

AFTER THE WAR

When World War II finally ends we must expect to encounter, in reverse, many of the conditions that developed as a result of the onset of this emergency. It seems inevitable that the process of redistribution and demobilization will carry with it hazards potentially dangerous to public health. The mass migrations of workers and their families, the discharge of war veterans, the resumption of immigration from countries now denied rudimentary measures of control, are all capable of complicating the fight against tuberculosis. The unsatisfactory conditions obtaining among tuberculous veterans of the last war are positive proof and a glaring example of what serious threats to personal and community health can be nurtured by a system that relies too little on sound education of patient, family and administration. They also indicate how far into the future past neglect can project. With reports indicating that nearly 100,000 men and women are being discharged from the Services each month, we can appreciate that demobilization will not wait upon the signing of an armistice. Thus, we are already at a point where we must place in operation an educational program that will be out of the fumbling stages and into full efficiency when greatest needs confront it. Whether it be among war veterans, industrial transients, returning students, our international neighbors or the great bulk of the American public, we must plan and administer a gigantic program of health education geared to whatever demands develop and ready to fit in with whatever medical and social readjustments may be in the making.

WARTIME LESSONS

Two other lessons learned from the war clamor for inclusion in our plans for tomorrow. One is that the authorities charged with the job of training vast numbers of troops in highly specialized branches of warfare in the shortest possible period of time have made telling use of every known medium of education. Mistakes have been made, but they have been eliminated and great strides taken in the direction of improving the presentation of educational material effectively and attractively. Health educators will do well to investigate the technics so successfully used in training men and women to do things, to work together, to preserve themselves and their associates from injury and death so far as was humanly possible. Many of these advances in the utilization of visual and auditory aids are directly applicable in the field of health instruction. However, we must remember that we shall have high standards of performance to follow. Incidentally, it seems reasonable to suppose that much of

the equipment now in use will be available to other agencies when military instructors are done with it.

The second lesson is one gleaned from "combined operations," if you will. It is high time that educational leaders in general recognize that no curriculum is worthy of being called modern or complete that omits the teaching of good personal and community hygiene or that fails to make available the protections to health in classroom and on campus that accepted practice demands. The companion piece to this is that everyone engaged in tuberculosis control and working toward tuberculosis eradication must recognize that fundamentally his program rests upon education. Health education that starts with the child and continues and expands until it embraces every adult is essential. Such an enterprise can be carried on only by teachers who themselves have been adequately trained, who have book knowledge matched by the daily facing and solving of health problems. Media such as the radio and the press must be provided with health writers who know of what they write. Public officials must be brought to regard public health as a precious communal possession to which each member of society has his own personal right and in the maintenance of which every other member has a stake. The occupational therapist and the rehabilitator need to understand basic tuberculosis facts just as the patient needs to understand his disease and how to resume useful living after it has been successfully treated. The medical and nursing professions are far from fully informed on the subject of tuberculosis and much remains to be done before their training is optimum in this regard. All in all, here is a challenging opportunity for educators of vision to contribute their experience and pool their resources toward an overall educational effort that will leave no loopholes of ignorance or indifference to weaken our array against tuberculosis. Here it is up to the health educator to assume the initiative. Where he leads, the enlightened recipients of his teaching will follow. Without people who trust him he will find few marching behind him.

EDUCATION IS BASIC

A recent newspaper dispatch told of the inauguration of Missouri's new law requiring blood serological tests by applicants as a prerequisite to a marriage license. As in many another state enforcing such a provision, the border cities in Missouri reported a virtual stoppage of license applications while nearby Kansas towns, immune from the law, reported a swelling stream of applicants. These people, it seems reasonably certain, were not all syphilitics suddenly deciding to marry and desperately trying to elude detection. What had happened was that legislation had been adopted before education concerning the purposes of the Act had been accomplished. These uninformed citizens, not realizing the protective benefits conferred on themselves and their offspring by a pre-marriage examination of this nature, were bent on evading what they incorrectly interpreted as an invasion of personal liberty. Some undoubtedly gagged on the small immediate cost of a medical examination and lost sight of the tremendous eventual saving. In a word, health education in Missouri either had not had a fair chance

or it had missed a golden opportunity. Similarly, it is very probable that those naturally alarmed by the unfortunately high percentage of patients leaving tuberculosis sanatoria contrary to medical advice and who would seek restrictive legislation as the answer to this great public health menace would be intensely disappointed in the reception accorded legal quarantining provisions, were the public not thoroughly prepared and convinced by proper education. Here again, in the sanatorium and out, the health educator has a job that cries for attention.

TOTAL HEALTH

Finally, the intelligent health educator will appreciate that few people are interested solely in tuberculosis as a threat to health and as an economic wrecker of home and happiness. A discerning program of education will

take into account every significant threat to health and will include appropriate coverage and instruction. Our responsibility to supply the facts concerning tuberculosis to every person in our community and to motivate him to action in his own behalf is clear. Our chances of winning and holding his interest and of securing his cooperation, however, depend in large measure upon our realistic approach to all his health problems and our display of capability in helping him to solve every one of them.

In closing, I ask indulgence to paraphrase Scripture, which should be permissible in so good a cause: And now abideth sanitation, segregation, education, these three; but the first of these is education. Will every health educator in the tuberculosis field, preoccupied with wartime problems and with his eye on peacetime opportunities, realize and fulfill his all-time obligation?

Tuberculosis Survey of Freshman College Students

A Report from the Tuberculosis Committee of the American Student Health Association

H. D. Lees, M.D., Chairman
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IN the Fall of 1942 the tuberculosis committee of the American Student Health Association requested a group of colleges in the East and Southeast to participate in a tuberculosis survey of their freshman students. These students were to be tuberculin tested and those who showed positive reactions were to be x-rayed. To insure uniformity in reporting, a record form was prepared by the committee and the colleges were asked to submit an individual record for each student included in the survey. This record includes name, age and sex; home address by state, city or town, and population of the home community; name and type of secondary school attended and result of the tuberculin test and chest x-ray.

The purpose of the survey, planned to be continued by this group of representative colleges over a period of years, may be outlined as follows:

To determine the prevalence of tuberculous infection and tuberculous disease among college freshmen, as determined by adequate methods of examination, and to observe any increase or decrease in such prevalence from year to year.

To show the relation between the proportion of positive tuberculin reactions and the location and size of the home communities from which the students come.

To determine whether there is any significant difference in the proportion of positive reactions to tuberculin among graduates of public high schools and among those who attended private preparatory schools.

Individual records were returned to the committee covering freshman students in 14 colleges located in the following eight states: Massachusetts, New Hampshire, Vermont, New York, New Jersey, Pennsylvania, Virginia, and North Carolina. Only 12 of these 14 colleges have been included in the general tabulations of this

study, since the other two evidently x-rayed their freshmen without a previous testing program. No information is available to indicate what proportion of all freshman students was tested in each college studied.

The 12 colleges returned records for 8,490 freshmen of which 1,038 or 12.2 per cent were excluded from the study. Nine hundred of these records were excluded because the students were not given tuberculin tests and 138 because they apparently were not freshman students.

The Tuberculosis Committee of the American Student Health Association requested the statistical service of the National Tuberculosis Association to tabulate the data submitted in connection with this study.

RESULTS OF TUBERCULIN TESTS BY COLLEGES

Table 1 shows the number of records returned by each college participating in the survey and results of the tests. Of the 7,452 freshman students who were given tuberculin tests, 1,442 or 19.4 per cent reacted positively.

According to this table, the percentage of positive tests ranged from 8.8 per cent among Smith College freshmen to a high of 48.1 per cent in Bennington College. It is difficult to account for this wide range except, perhaps, on the basis of difference in interpretation of the positive reaction. It is the opinion of this committee that over-reading is probably more frequent than under-reading. The Committee on Diagnostic Standards of the National Tuberculosis Association defines the positive reaction as follows: "A positive reaction is one that shows edema and redness of varying degree after forty-eight hours or later. If there is no edema, the reaction should be considered negative."

In each of these two colleges a majority of the freshman class prepared for college at private schools. At

Bennington, 76.0 per cent of the freshman students were graduates of private preparatory schools, compared to 55.7 per cent of the Smith freshmen.

TABLE 1
Freshman Students Given Tuberculin Tests and Number and Percentage of Positive Reactions, Classified by College

College	Total records received	Records excluded from study	Freshmen tuberculin tested		
			Total	With positive reactions	
				Number	Per cent of total
All colleges studied.....	8,490	1,038	7,452	1,442	19.4
Amherst College.....	277	-	277	66	23.8
Bennington College.....	106	2	104	50	48.1
Bryn Mawr College.....	164	2	162	34	21.0
Pennsylvania State College.....	2,091	63	2,028	450	22.2
Princeton University.....	690	3	687	100	14.6
Rutgers University.....	456	2	454	119	26.2
Smith College.....	638	365	273	24	8.8
Syracuse University.....	1,695	174	1,521	229	15.1
University of Pennsylvania.....	838	284	554	167	30.1
University of Virginia.....	494	106	388	60	15.5
Wake Forest College.....	107	5	102	32	31.1
Woman's College, University of North Carolina.....	934	32	902	111	12.3

In Table 2 the results of the tuberculin tests are shown in detail for each of the 12 colleges studied. The tests were definitely negative for 5,984 freshmen or 80.3 per cent of the total number studied. While the results of the tests were doubtful in the case of 14 students subsequent x-rays proved negative for tuberculosis in each instance.

TABLE 2
Freshman Students Given Tuberculin Tests and Results of Tests, Classified by College

College	Freshmen given tuberculin tests with specified results				
	Total	Positive reaction	Negative reaction	Result doubtful	Result not reported
All colleges studied.....	7,452	1,442	5,984	14	12
Amherst College.....	277	66	211	-	-
Bennington College.....	104	50	54	-	-
Bryn Mawr College.....	162	34	123	5	-
Pennsylvania State College.....	2,028	450	1,578	-	-
Princeton University.....	687	100	587	-	-
Rutgers University.....	454	119	335	-	-
Smith College.....	273	24	243	3	3
Syracuse University.....	1,521	229	1,283	-	9
University of Pennsylvania.....	554	167	387	-	-
University of Virginia.....	388	60	322	6	-
Wake Forest College.....	102	32	70	-	-
Woman's College, University of North Carolina.....	902	111	791	-	-

PULMONARY LESIONS REVEALED BY X-RAY

Of the 7,452 freshmen included in this survey, 5,984 were ruled free of tuberculosis on the basis of negative tuberculin tests. Chest x-rays were provided for 1,384 of the 1,442 students who reacted to tuberculin. A total of 7,368 students, therefore, completed all phases of the examination. Ten students were found to have tuberculosis, an incidence of slightly more than one-tenth of one per cent, or 13 per 1,000.

Compared with other studies of tuberculosis among college students, the incidence of disease in this group is quite low. This may be accounted for in part, at least, by the fact that this study was limited to freshmen students. The average age of such a group is approximately two years younger than college students as a group. Then too, there were 18 students who presented questionable

or suspicious x-ray findings where a diagnosis could not be made on the basis of the initial examination. As a result of further study, including frequent chest films, it is quite probable that a number of this group, now designated as tuberculosis suspects, will later be classified as pulmonary tuberculosis.

TABLE 3
Freshman Students with Positive Reactions to Tuberculin and the Results of X-ray Examinations, Classified by College

College	Total	Positive reactors and the results of X-ray examinations				
		Active tuberculosis	Suspicious X-ray findings	Healed tuberculosis	Non-tuberculous	Not X-rayed
All colleges studied.....	1,442	5	18	5	1,356	58
Amherst College.....	66	-	-	-	66	-
Bennington College.....	50	-	1	-	49	-
Bryn Mawr College.....	34	-	-	-	33	1
Pennsylvania State College.....	450	1	5	-	442	2
Princeton University.....	100	-	-	1	99	-
Rutgers University.....	119	-	3	-	116	-
Smith College.....	24	-	-	-	24	-
Syracuse University.....	229	-	9	4	201	15
University of Pennsylvania.....	167	2	-	-	146	19
University of Virginia.....	60	-	-	-	58	2
Wake Forest College.....	32	-	-	-	19	13
Woman's College, University of North Carolina.....	111	2	-	-	103	6

TYPE OF PREPARATORY SCHOOL AND SEX

More than three-fourths of the 7,452 freshman students given tuberculin tests (77.5 per cent) were graduates of public high schools, while one-fifth of the number prepared for college at private preparatory schools. The number of freshmen who reported that they had been graduated from parochial schools was negligible. A larger proportion of the boys prepared for college at private schools than was the case with the girls.

TABLE 4
Number and Per Cent Distribution of Male and Female Freshman Students Given Tuberculin Tests, Classified by Type of Preparatory School

Type of preparatory school	Freshmen of both sexes		Male freshmen		Female freshmen	
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
All types.....	7,452	100.0	4,686	100.0	2,766	100.0
Public high school.....	5,773	77.5	3,481	74.3	2,292	82.9
Private preparatory school.....	1,517	20.4	1,101	23.5	416	15.0
Parochial high school.....	124	1.7	82	1.7	42	1.5
Type of school not reported.....	38	0.5	22	0.5	16	0.6

The distribution of the 1,442 male and female positive reactors by type of preparatory school is given in Table 5. Proportionately more males than females reacted positively, the percentage among males being 21.3 per cent and among females 16.0 per cent. This finding agrees with that of other studies¹ even though the death rate among males 15 to 19 is much lower than among females of that age group.

When both sexes are considered there is no significant difference in the percentage of positive reactions among freshmen who attended the different types of secondary

¹"A Summary of the Results of Group Tuberculin-Testing with P.P.D. in the United States," by Jessamine S. Whitney and Isabel McCaffrey, p. 603.

schools. Curiously enough, however, male students from public schools showed a higher proportion of positive reactions, while more girls from private preparatory schools reacted positively than did those from public schools.

The larger percentage of positive reactions for males holds true for public school and parochial school graduates. But girls from private schools showed slightly more positive reactions than did boys who attended the same type of school.

TABLE 5
Freshman Students Given Tuberculin Tests and Number and Percentage of Positive Reactions, Classified by Sex and Type of Preparatory School

Sex and type of preparatory school	Freshmen tuberculin tested		
	Total	With positive reactions	
		Number	Per cent of total
Both sexes	7,452	1,442	19.4
Public high school	5,773	1,124	19.5
Private preparatory school	1,517	288	19.0
Parochial high school	124	22	17.7
Type of school not reported	38	8	21.1
Male	4,686	1,000	21.3
Public high school	3,481	774	22.2
Private preparatory school	1,101	205	18.6
Parochial high school	82	16	19.5
Type of school not reported	22	5	22.7
Female	2,766	442	16.0
Public high school	2,292	350	15.3
Private preparatory school	416	83	20.0
Parochial high school	42	6	14.3
Type of school not reported	16	3	18.8

The 1,517 freshmen who prepared for college in private schools were classified as to the individual schools from which they came. In all, 421 private schools were represented, though 184 had but one graduate each who was among the group tested. Each private school from which 20 or more of these freshmen had been graduated is listed in Table 6.

TABLE 6
Freshman Students from Private Preparatory Schools who were Given Tuberculin Tests and Number and Percentage of Positive Reactions, Classified by Private School

Private preparatory school	Freshmen tuberculin tested		
	Total	With positive reactions	
		Number	Per cent of total
All private schools	1,517	288	19.0
Lawrenceville School, Lawrenceville, N. J.	52	9	17.3
Phillips Exeter Academy, Exeter, N. H.	38	9	23.7
The Choate School, Wallingford, Conn.	37	6	16.2
Phillips Academy, Andover, Mass.	34	9	26.5
Deerfield Academy, Deerfield, Mass.	33	6	18.2
Hill School, Pottstown, Pa.	27	5	18.5
Polytechnic Preparatory Country Day School, Brooklyn, N. Y.	23	6	26.1
St. Paul's School, Concord, N. H.	23	3	13.0
Mercersburg Academy, Mercersburg, Pa.	22	3	13.6
All other private schools	1,228	232	18.9

Most of the 7,452 students tested were between the ages of 16 and 19, though 149 or 2 per cent of the freshmen were more than 20 years of age.

HOME COMMUNITIES OF STUDENTS

The percentage of positive reactors differs little when classified by the size of the home communities of the students. In each population group, however, more males than females reacted positively. These points are brought out in Table 7.

TABLE 7
Freshman Students Given Tuberculin Tests and Number and Percentage of Positive Reactions, Classified by Sex and Size of Home Community

Sex and size of home community	Freshmen tuberculin tested		
	Total	With positive reactions	
		Number	Per cent of total
Both sexes	7,452	1,442	19.4
Less than 1,000 population	721	131	18.2
1,000 to 10,000 population	2,048	400	19.5
10,000 to 50,000 population	1,688	331	19.6
50,000 population and over	2,967	569	19.2
Population not reported	28	11	39.3
Male	4,686	1,000	21.3
Less than 1,000 population	402	77	19.2
1,000 to 10,000 population	1,274	277	21.7
10,000 to 50,000 population	1,098	236	21.5
50,000 population and over	1,897	405	21.3
Population not reported	15	5	33.3
Female	2,766	442	16.0
Less than 1,000 population	319	54	16.9
1,000 to 10,000 population	774	123	15.9
10,000 to 50,000 population	590	95	16.1
50,000 population and over	1,070	164	15.3
Population not reported	13	6	46.2

EXCLUSIONS

Twelve per cent or 1,038 of the 8,490 survey cards received in connection with this study have been excluded from the foregoing tabulations. Of this number 900 could not be included because they had not been given tuberculin tests; 826 of this group were x-rayed, however, and 817 negative films resulted, as well as 2 healed cases, 5 suspicious cases, and 2 active cases.

All of the 138 students excluded from the survey because they were not freshmen had been tuberculin tested. The 31 with positive reactions were x-rayed; 30 of the films proved to be negative and one suspicious case was found.

According to Table 8, several of the colleges partici-

TABLE 8
Records Excluded from Study for Specified Reason, Classified by College

College	Records excluded from study		
	Total	No tuberculin test given	Non-freshmen
All colleges studied	1,038	900	138
Amherst College	-	-	-
Bennington College	2	1	1
Bryn Mawr College	2	1	1
Pennsylvania State College	63	60	3
Princeton University	3	3	-
Rutgers University	2	2	-
Smith College	365	361	4
Syracuse University	174	169	5
University of Pennsylvania	284	281	3
University of Virginia	106	17	89
Wake Forest College	5	-	5
Woman's College, University of North Carolina	32	5	27

pating in the study failed to give tuberculin tests to sizable groups of their freshman students.

Goucher College and Dartmouth College are the two colleges where no testing program was carried on, though their freshman students were x-rayed. Goucher reported that 123 of their 134 freshmen had been x-rayed and none showed evidence of active tuberculosis. Nine of the Goucher freshmen were tuberculin tested with negative results and two were neither tested nor x-rayed.

Dartmouth College returned 591 records indicating that 589 had been x-rayed. One case of active tuberculosis was found, as well as 4 suspicious cases and 17 healed primary cases.

SUMMARY AND CONCLUSION:

A study made recently in 12 eastern and southeastern colleges reveals the fact that 7,452 freshman students were tuberculin tested and 19.4 per cent of their number showed positive reactions.

As in earlier surveys more male students reacted positively than did female students. Among the male freshmen, positive reactors numbered 21.3 per cent, compared to 16.0 per cent among the females. This finding is always of interest in view of the fact that the tuberculosis death rate among females 15 to 19 years is much higher than among males in the same age group.

When both sexes are considered, no significant difference is found in the percentage of positive reactions among freshmen who had been graduated from private preparatory schools when compared with those from public high schools.

This finding is not in accord with the contention of certain educators that tuberculosis is less prevalent among students of private secondary schools.

A slightly higher percentage of positive reactions was found among female students from private preparatory schools than among male students who entered college from secondary schools of this type. Positive reactions

were more numerous among girl graduates of private schools than among those from public high schools.

In the case of male students the percentage of positive reactions was somewhat higher among public high school graduates.

The size of the home community of the student seemed to be a negligible factor in the number of positive reactions found.

Ten cases of pulmonary tuberculosis were discovered among the 7,368 students included in this survey. Five cases were designated as active and five as inactive or healed. In addition, 18 freshmen presented x-ray findings which warranted classification as tuberculosis suspects.

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Charles E. Lyght, M.D., National Tuberculosis Association, New York, New York.

Orville Rogers, M.D., Yale University, New Haven, Connecticut.

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Henry Sweany, M.D., Municipal Sanatorium, Chicago, Illinois.

News-Letter

of the American Student Health Association

Student Health Services in the War*

J. P. RITENOUR, M.D.†
State College, Pennsylvania

College and University health services have now assumed a definite place in the war effort. Only a little more than a year ago they were becoming adjusted to the changes incident to newly established accelerated courses. Then, following plans of the Army and Navy to assign groups of men to college and university campuses for special training, they were confronted with many problems to be solved in carrying out their part of the program.

Those who were aware of the difficulties inherent in any plan involving the medical care of both civilian and military students, by a single unit untrained in military

*President's address, presented at the twenty-third annual meeting of the American Student Health Association, Hotel Gibson, Cincinnati, O., March 15-16, 1944.

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procedure and requirements and lacking knowledge of Army-Navy Rules and Regulations, contributed materially to the solution of the problem by indicating the obstacles that were likely to be met and suggesting means to overcome them.

Many of these problems have been resolved, but now health services find themselves faced with other perplexing problems because of the recently announced change of plan on the part of the Army. With the practically complete depletion of many men's colleges of their students and extensive inroads into the male contingent of co-educational institutions by the withdrawal of students enrolled in the ASTP, new problems demanding solution have arisen.

These are indeed disturbing times for all engaged in health service work. Because of the very nature of the work, progress must be made slowly and yet the immediate needs of the colleges and universities must be met

without undue delay. It was necessary to readjust the facilities of many health services in order to meet the unusual demands that had been placed upon them, and as plans respecting these facilities progressed, their use became more and more acceptable.

Undoubtedly at this meeting various aspects of the problem will be presented by heads of different services and much enlightenment shed upon them that will aid in the development of plans to meet situations as they develop.

One major problem of all health services was, of course, to accommodate their facilities to meet the new demands made upon them. You can appreciate the difficulties which surrounded the task of adjusting the staffs, both professional and clerical, to meet the situation.

To those without knowledge of military customs and the inordinate amount of "paper work" necessary to meet Army or Navy requirements, the task must have seemed almost insurmountable. The depleting of professional staffs by the armed forces and the inability to secure competent clerical help did not ease the situation. Indeed, it is to the everlasting credit of the health services that under such trying circumstances they have given a good account of themselves.

The health services as they stand today are a part of the war effort and their relation to the national program for the specialized training of men in the armed forces is creditable to the foresight and wisdom of college authorities in establishing such agencies. May it never be said that they did not arise to the occasion and perform their tasks in an acceptable manner.

Out of wartime experiences you may wonder, perhaps, what trends have been discovered that may presage the health services of the future. It is my purpose to say something about this without anticipating the planned studies which undoubtedly will be carried out under the leadership of able officers and committees.

It will be the responsibility of these committees to review the relations of the health services to the colleges and universities with consideration of the extent to which they are now meeting those responsibilities; our present organization and administrative procedure; the programs now being carried out at different institutions and the extent to which they may be amplified, curtailed, or revised to meet the needs of institutions of various types; to suggest means for improving the quality of the services with proper division of emphasis on hygiene teaching, preventive medicine and clinical practice; to effect improvements in instructional methods and other provisions for quickening interest in healthful living; to measure the relations of sound health knowledge to successful living, with particular reference to the relation of improper living to clinical medicine. And finally there is the vital question of how to plan for the health needs of returning men whose education was interrupted by military service, or men who have been injured in service and are assigned to colleges and universities for continuance of their education under the program of rehabilitation.

The manner in which health services have responded to the war effort raises the question as to the necessity of suggesting any changes in the customary procedures. The

way in which health services, in a comparatively short time, have turned their facilities into units approved for rendering medical service to Army and Navy detachments is largely one of credit to the prevailing system. A system which has met on such short notice a critical situation and has furnished valuable service in the furtherance of the objectives of the military forces needs no sharp readjustments in order to maintain its full force in the post-war world.

It would be folly to turn our backs upon the good that has been accomplished by this Association through the past years and endeavor, because of the war effort, to substitute any fundamental changes in health service procedures or practices.

Since the founding of this organization almost twenty-five years ago, I have watched its growth and progress with considerable satisfaction. It has never deviated from its course. In the trying days to come we can do no less than give its direction our full support and strength.

During this period of tension through which we are passing, there have evolved some proposals which may be inimical to the steady progress of the Association. Should some of these devices be adopted because of the pressure of special groups, they may be wholly undesirable from our point of view. One wonders, for instances, should the proposed Wagner-Murray-Dingell bill pass both branches of the Congress and be signed by the President, will its provisions embrace the medical care and hospitalization of some of the boys and girls attending colleges and universities? If so, what will be the effect upon health services? The bill in its present form is so inconclusive that its passage may have a profound effect upon present-day health service functions.

With such a measure in effect, what will be the relation of health service medical staff members to students? The bill makes so many provisions for its beneficiaries and has so many ramifications involving the medical profession that it would be well for each one of us to acquaint ourselves with its implications and keep informed regarding its progress through the halls of the Congress. Then, if the bill should reach final passage and become a law, suitable adjustments may be made to meet its requirements.

The necessity for a unified effort on the part of physicians for an organization to oppose such radical legislation has led to the formation of the Association of American Physicians and Surgeons. Desirable as it may be to lend support to an organization engaged in such a worthy enterprise, after carefully reading the Articles of Incorporation and By-Laws, one may, I trust, without impugning the aims and objectives of the incorporators, raise the question as to what eventually will be the position of those subscribing for membership in it who are at present engaged in health service work in institutions of higher learning? These are questions about which we are quite naturally concerned but about which it is, as yet, too early to reach definite conclusions. Nevertheless, the information we gain from their study, and consideration of their trends, will direct us in their solution.

At the moment we need take neither a radical nor a conservative attitude toward such subjects. Rather, we should note and observe changes that are taking place

incident to altered conditions and thus be prepared to make any required adjustments.

We are now enveloped in an atmosphere of hurried service, all endeavoring to give a good account of ourselves, but when peace comes and the air is clarified let us hope it may be observed that the American Student Health Association has retained those traditional features which have carried it forward over the past. May the future offer it greater opportunities for service.

TWENTY-THIRD MEETING

Interest expressed by the representatives at the Association meeting in Cincinnati March 15-16 bears out the opinion of many of our members that regular meetings should be held if at all possible. The registration of fifty-five delegates represented almost as many schools from California to New Hampshire and Minnesota to Georgia.

The program arranged by the Ohio section under the immediate direction of Dr. Lawrence Chenoweth of the University of Cincinnati was based entirely on present day problems in health services, and met with enthusiastic approbation by the very attentive audience. The guest speakers were directly connected with health services and presented subjects of practical interest. Their papers will appear in the *JOURNAL-LANCET* in due time and will be included in the Proceedings. Among the speakers were: Dr. J. P. Ritenour, president, whose address is printed in this issue; Dr. Ivor Clark, Vision Problems of Military Students with Heavy Academic Loads; Dr. Raymond Walters, president of the University of Cincinnati, Higher Education in the Postwar Era; Drs. Florence Mahoney, Glenadine Snow, Amelia Wood and Helen B. Pryor, Effects of the War on the Health of College Women; Drs. E. Lee Shrader and P. O. Muehler, Clinical and Laboratory Studies of Influenza Epidemic; Dr. Carl J. Wyler, Neurotic Problems in a Student Practice; Dr. Leonard J. Stark, Low Back Troubles in A.S.T.P. Students, and Dr. Harry Sigel, Dermatological Problems in A.S.T.P. Students. Administrative questions were dealt with by Dr. Jno. W. Wilce, Columbus, O., Dr. Geo. T. Blydenburgh, Delaware, O., and Dr. A. O. DeWeese, Kent, O.

The address of President Raymond Walters of the University of Cincinnati at luncheon revealed his keen insight into problems of education now and after the war. The hospitality of the University was extended to the delegates in a reception at the University and a visit to Dr. Chenoweth's health service.

The new officers for the coming year are Dr. Ralph I. Canuteson, University of Kansas, President, succeeding Dr. J. P. Ritenour; Dr. Glenadine Snow, Michigan State Normal College, Vice-President, succeeding Dr. J. G. Grant; Dr. Helen B. Pryor, Stanford University, Secretary-Treasurer, succeeding Dr. Ralph I. Canuteson; and for council members Dr. R. A. Lyman, University of Nebraska, Dr. B. D. Roberts, University of New Hampshire and Dr. Lawrence B. Chenoweth, University of Cincinnati, succeeding Dr. George T. Blydenburgh, Dr. Grace Hiller and Dr. H. D. Lees.

Recognizing the uncertainty of making plans so far ahead and the congestion of eastern cities, the Council set the next meeting for Minneapolis and the dates tenta-

tively May 2-3, 1945. A plan is under consideration to arrange a get-together of representatives of Eastern schools at the time of the next meeting of the American Public Health Association in New York.

DIGEST OF MEDICAL NEWS

During the important age period, 45 to 50, as little as 25 pounds overweight will reduce the life expectancy by 25 per cent while 50 pounds overweight will impose as much extra mortality as valvular heart disease, according to Dublin and Lotka's figures (*Length of Life*, New York, The Roland Press Co., 1936). Until recently it has been assumed that the underlying causes of obesity were commonly a low metabolic rate or some serious disturbance of the glands of internal secretion. Recent work has, however, thoroughly discredited this assumption. Though heredity is highly important in determining body build it is still not found to determine the presence of obesity. The general cause of most obesity would appear to be overeating, and underlying the desire to overeat Newburgh (*Arch. of Inter. Med.* 70:1033, 1942) lists the following subcauses:

- (1) Overemphasis by a parent of the importance of food in a child's upbringing.
- (2) Gratification obtained from the flavors of foods.
- (3) The feeling of repose and comfort produced by a full stomach.
- (4) The temporary respite from anguish caused by intellectual, social or sexual failure.
- (5) The food habits of youth which are carried over into middle age, even though the need for food is diminished.
- (6) Disabling disease with its lessened energy requirement which is compensated for by an indulgence in food.

Cheese-borne Epidemic of Typhoid. Many have assumed that the process of cheese making serves to destroy any pathogenic bacteria present in the milk before processing. Further evidence confirming the falsity of this assumption is presented by Gauthier and Foley (*Canadian Jour. of Public Health* of December, 1943). These authors describe an outbreak of typhoid fever occurring in a county on the northern shore of the St. Lawrence River in which cheddar cheese produced in one factory apparently was the means of conveying the infection to 34 persons in the county and 6 more in Montreal and Boucherville. Of the 40 cases, 6 proved fatal. The milk used at the cheese factory was produced on 80 farms. A careful study of the 80 farms revealed a known typhoid carrier who was finally forced to admit that she had milked cows against orders and had sent the milk to the cheese factory under investigation.

Smallpox Vaccination and Pulmonary Tuberculosis. In the July-October issue of the *British Jour. of Tuberculosis*, Keers and Steen warn that under conditions necessitating widespread vaccination, special caution should be exercised before submitting patients with pulmonary tuberculosis to this procedure. They report 4 cases admitted to their sanatorium in Glasgow, all of whom gave a history of vaccination followed very shortly by the appearance of symptoms of pulmonary tuberculosis. The authors appear to feel that there is sufficient evidence to justify the assumption that vaccination may cause a flare-up in a latent tuberculous focus.

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TUBERCULIN TEST, X-RAY AND OTHER DIAGNOSTIC AIDS

There is now a strong tendency to "diagnose" tuberculosis by "short-cut" and "slipshod" methods. A few physicians were asked how they would proceed to find all of the tuberculosis among the population of an entire industry or county. One stated that increased red cell sedimentation rate would ferret out all cases. Another would discover them by finding acid-fast bacilli in their sputa. Still another would employ only x-ray film inspection of their chests. Other similar methods were offered. Each physician presented an important phase of an examination, but not one of them was adequate. To do satisfactory diagnostic work, each one of this group of physicians would have to examine a given individual, then weld their findings together.

There can be no tuberculosis in the absence of tubercle bacilli; therefore, the first phase of an examination consists of determining whether they exist. This can be done by the tuberculin test, which is accurate and specific ex-

cept in the first few weeks after infection occurs, and in acutely ill and terminal cases. Other failures are usually due to the use of impotent tuberculin or improper administration. With these exceptions, the non-reactor to tuberculin can be told that he does not have living tubercle bacilli in his body. On the other hand, the reactor has at least primary lesions which contain living tubercle bacilli. The only exception is when all bacilli die, after which allergy persists for a time, then wanes and disappears. Inasmuch as primary tuberculosis is a prerequisite for the clinical forms, it is of extreme importance to know whether it is present. The tuberculin test provides this information with uncanny accuracy. With the exceptions mentioned, it is with great rarity that the person with clinical tuberculosis fails to react to tuberculin.

The next phase of the examination consists of inspecting the chests of all adult reactors with the x-ray. On the ordinary film 25 per cent of the lung parenchyma is obstructed from view by shadows of such parts as the heart and diaphragm. It fails to reveal evidence of pri-

many tuberculosis in 70 to 80 per cent of the persons in whom it is present. This may also be true of lesions of the reinfection type because of their size and consistency. It is a common experience to view a film which appears clear, yet one of the same chest a few months later reveals evidence of disease. Therefore, adult tuberculin reactors whose lungs appear normal should have films at least annually.

After tuberculous lesions of the reinfection type attain macroscopic (gross) proportions, x-ray inspection is by far our best method of detecting their locations when they are in that part of the lung which is visualized; indeed, they cast shadows on an average of two or three years before they cause significant symptoms. However, final diagnoses should never be made from x-ray shadows, since those cast by tuberculous lesions may be identical with those of numerous other pulmonary diseases, such as sarcoidosis, silicosis, malignancy, fungus infections, abscess, and pneumonia. When a lesion is found, its etiology can usually be determined by other methods.

The present, widely used procedure which begins with x-ray inspection of the chests of large groups of adults is laudable, provided all concerned are informed that (1) x-ray inspection is done with the unaided eyes and reveals nothing but macroscopic (gross) lesions; (2) one-fourth of the lung parenchyma is obstructed from view by shadows of other parts; and (3) final diagnoses can not be made with accuracy from x-ray shadows. Thus, the tuberculin test screens out those persons who have living tubercle bacilli in their bodies, and from them the x-ray screens out those who have gross lesions which may be tuberculous. Neither or both procedures constitute an adequate examination.

To determine whether a demonstrable lesion is tuberculous one must seek tubercle bacilli in material obtained from it. Among individuals with extensive tuberculous lesions they are usually promptly recovered from the sputum. When they are not found in more than one of several specimens, or if no sputum is present, gastric lavage may reveal their presence. Visualizing acid-fast organisms by the aid of the microscope may not be sufficient because of laboratory errors and also because nonpathogenic, acid-fast bacilli are sometimes found in the sputum and gastric contents; therefore, their pathogenicity should be determined by culture on artificial medium or animal inoculation. In the event tubercle bacilli or other pathogenic organisms are not recovered, one should observe frequently the x-ray shadows to determine whether they persist or any significant changes occur in or around them. However, among persons beyond thirty-five years one should avoid delay, as the lesion may be malignant. In such cases the bronchoscopist should be consulted, as he may promptly reveal the etiology.

There is no more deplorable practice than to have tuberculin tests administered and x-ray films prepared, after which the physician makes diagnoses without seeing the subject and completing the examination. The individual should always be interviewed by the physician. While most persons have no symptoms for an average of two or three years after the disease can be located and practically none of those with primary tuberculosis give histories of significant illness, the tuberculin reactors

whose chest films are entirely clear may relate symptoms caused by extrathoracic tuberculosis. Indeed, they may be developing acute conditions, such as meningitis or miliary disease, or chronic lesions in such parts as the kidneys, pelvic organs, and bones and joints.

Following the interview, even though no significant evidence is obtained, the remainder of the examination should be made, since significant pulmonary signs may be elicited from lesions located near the periphery or in parts of the lungs not visualized by x-ray; moreover, lesions may be found in extrathoracic organs.

Tuberculosis begins when the first tubercle bacilli enter the human body and are focalized in microscopic lesions. At this stage the disease may lie dormant or may even disappear. Again, it may undergo exacerbations and remissions resulting in every form of clinical tuberculosis to which the human body is heir. The physician can now diagnose tuberculosis within a few weeks after the first invasion of tubercle bacilli, and he can detect most of the subsequent lesions with considerable promptness. To diagnose tuberculosis when it does not exist or to fail to find it when it is present, is inexcusable. Nearly all errors in diagnosis are due to "short-cut" or "slipshod" methods and may be avoided by employing every phase of a complete examination.

J.A.M.

FOCAL INFECTIONS

"We don't kill babies just to have funerals, neither do we kill nerves because of toothache" was the dramatic statement made by someone in a medico-dental conference on focal infections many years ago, and while it was not an altogether logical parallel, it was impressive and we remember it to this day.

Even as nature abhors a vacuum, so the living body revolts at the presence of dead tissue or a foreign body in its midst, and takes steps to make it innocuous. This is usually accomplished by some inflammatory process that leads to extrusion, absorption or encapsulation of the offending irritant. Inflammation implies infection with all its attendant dangers and possible consequences; and, inasmuch as a dead tooth invites such catastrophes, it has become a well established practice among dentists to save if possible the life of every tooth they are called upon to treat.

The theory of focal infection in chronic disease as we understand it is not generally accepted in any other country but our own, and there are some doubting Thomases even here. We have become so accustomed to the many remarkable recoveries from arthritis and neuritis following the removal of diseased teeth and tonsils that we naturally infer that they were the source of the systemic infection in every such case when the symptoms disappear. In other cases the results of the same painstaking elimination of suspected foci have been inexplicably disappointing. Perhaps the search had not been sufficiently diligent to bring to light a remote and hidden factor. There can be but one lesson drawn from such failures. The scope of our suspicion must be extended and our assiduity increased. Dentistry has done a great deal to support the affirmative side of the contention.

A.E.H.

DRINKING AND SMOKING, 1944

You don't have to listen very hard these days to hear the wings of the prohibition bird flapping again in legislative corridors. And only a little more distant are the chirpings of the anti-smoking flock. It seems highly probable that before this war is won many a legislature will be urged to pass laws and more laws to check these "vices". Surely it is high time that the public learn that the moderate indulgence in smoking and drinking is not a vice at all, that no moral issues are involved, that they represent at most health problems for the individual. Alcohol and smoking should be moved for all time out of the field of ethics into consultation rooms where they can be met realistically, without the connotations of good and evil. What has the doctor to do with all this? In the first place when the prohibition controversy wages, his opinion is pretty sure to be sought and he can help considerably by ridding the question of its emotional artifacts and by broadcasting the facts now accepted by the majority of scientists. We know a lot more about the actual effects of alcohol and smoking on the body tissues than we did when prohibition was last an issue. In ranking importance the two seem to have changed places. In spite of those pictures in the early "physiologies" of pickled livers and stomachs that once fascinated childish minds, it now seems that alcohol used in moderation may be the friend, not enemy, of man and probably has been right along. Smoking on the other hand, has become something of a master criminal—at least in the eyes of statisticians, biometricians, pathologists, etc. These gentlemen disregard our favorite ninety-year old geezer who confesses to have smoked steadily since he was five. Instead they point to such experiments as those of the Life Extension Institute where among 800 employees the electrocardiogram showed changes in the heart occurring one and a half times more often among smokers than non-smokers—and this before a single symptom had appeared. They suggest that we note the effect on the circulation as demonstrated by the thermocouple, the slowing of the movement of the blood cells easily seen under the microscope when the smoker inhales, and so on.

None of these can be easily tossed off, and yet who can prove to the confirmed smoker, smugly regarding his ancestors and his siblings, that the hazard is not worth the risk? The human animal has proved many times that he won't stop drinking and smoking merely to be "good". Indeed he probably would never have sustained the unpleasant initiation into both habits but for the lure of feeling devilish. But as the years creep up on him he becomes more and more health conscious, more eager to know and to do those things that will help him to live a little longer and more fully. He begins to wonder whether that friendly glass and comforting pipe have anything to do with his quickened breathing, that dull ache in his epigastrium. We may not all agree with the statisticians and the biometricians, but after we have ruled out all the positive counter-indications, surely we owe it to our patients to give them all the knowledge we have and leave the choice to them. And we owe it to our communities to strip this business of moderate drinking and smoking of all emotional and moral overtones and to face it for what it is, a health problem that becomes social only when abuse ends in antisocial behavior. M.U.

Book Reviews

A Manual of Methods for Organizing and Maintaining a Central Tuberculosis Case Register, by EDWARD X. MIKOL, M.D.; National Tuberculosis Association, 1790 Broadway, New York, N. Y., 1943.

This manual of 70 pages is another excellent publication of the National Tuberculosis Association. Dr. Mikol has had an extensive experience and is thoroughly aware of the value of a central tuberculosis case register in controlling this disease. He points out that the chief purpose of such a register is to provide for administrative purposes a central, simple, complete and easily accessible record of all the vital facts about tuberculous patients or contacts or both from the beginning to the end of their observation.

To establish such a register is a laudable undertaking and, indeed, it is absolutely essential to any community that seriously desires to control tuberculosis. Dr. Mikol describes the various types of case registers and discusses all of the information that should be introduced. He emphasizes the fact that a case register should logically be maintained by the official health agency. Inasmuch as tuberculosis remains the most dangerous and destructive contagious disease in most parts of this country, it should be the duty of every city, county, district and state health department to know at all times the whereabouts of the contagious cases of tuberculosis. The author calls attention to the great value of such a register in determining facts concerning such subjects as prognosis and epidemiology of tuberculosis. In this volume emphasis is placed primarily on the diagnosed case and his known contacts.

In the next edition it would be fine if the author would include every tuberculin reactor within the jurisdiction of the health department, since each reactor is a potentially clinical case of tuberculosis and throughout adulthood should be kept under most careful observation. Every official health department in this country, as well as every other organization engaged in tuberculosis work, should not only be in possession of this manual, but should also profit by the large store of information it contains.

Office Treatment of the Nose, Throat and Ear, by ABRAHAM R. HOLLENDER, M.Sc., M.D., F.A.C.S.; Associate Professor of Laryngology, Rhinology and Otology, University of Illinois College of Medicine; Otolaryngologist, Research and Educational Hospitals. Chicago: The Year Book Publishers, Inc., 480 pages including index and illustrations. 1943, price \$5.

In the first section of this work the author presents a general survey of all of the therapeutic measures used in treating diseases of the ear, nose and throat. Section II is rather a thorough presentation of the technical details of the office management of otolaryngological diseases. At the end of each of the 39 chapters is a list of references. The material is well organized, the style is concise, and the illustrations are adequate.

This book has practical values and can be recommended to clinicians whether general practitioners or otolaryngologists.

The Nature and Treatment of Mental Disorders, by T. V. MOORE, M.D. New York; Grune & Stratton, 316 pages, appendix, references and index, 1943, price \$4.

This book comprises a description and discussion of a wide variety of psychotherapeutic technics employed by the author in his clinical experience. The most instructive feature of this treatise is the interesting case reports used by the author to illustrate his various therapy procedures. The chapters describing family and childhood problems and their treatment are exceptionally well done and most instructive. This book is an excellent contribution as a supplementary study in psychiatric procedures, but it presupposes a basic understanding of psychiatry.

(Continued on page 132)

News Items

Dr. F. D. Hurd has been elected president, Dr. H. W. Fuller, vice president, and Dr. Charles Little, secretary of the Cascade county (Montana) medical society for the coming year.

Dr. W. L. Meyer of Sanator, South Dakota, presided at a meeting of the Black Hills medical society held in Lead on February 24th. Interesting papers were read by Dr. Lyle Hare of Spearfish, and Dr. Paul P. Ewald and Dr. N. W. Stewart of Lead.

Dr. and Mrs. D. B. Rice have resigned active management of the Britton, South Dakota hospital after a service which lasted sixteen years. Dr. Rice will continue private practice of internal medicine.

Dr. Miguel Drobinsky is a member of the executive board of the Estelline, South Dakota Commercial Club which has recently appointed committees to investigate the community's need of a hospital after the war, and to consider the matter of milk pasteurization.

Dr. S. S. Hoyum, sole resident physician and surgeon of Elkton, South Dakota, a community of about 2,500, has been the subject of a local petition to the selective service authorities for indefinite deferment.

At the January meeting of the Huron District South Dakota medical society the following officers were elected: president, Dr. Paul Tschetter, DeSmet; president-elect, Dr. H. L. Saylor, Huron; secretary and treasurer, Dr. R. A. Buchanan, Huron.

The Woman's auxiliary to the seventh district (Sioux Falls), of the South Dakota state medical association met on March 14th at the home of Mrs. T. Billion and re-elected all its officers. These are: Mrs. T. J. Billion, president, Mrs. M. O. Lanam, vice president; Mrs. William Sercl, secretary; Mrs. J. A. Nelson, treasurer.

Dr. L. W. Larson, Bismarck, North Dakota, attended the annual meeting of the board of directors of the American society for the Control of Cancer held in New York City, March 9, 10, and 11. On February 28 Dr. Larson attended the meeting of the Cass county district society as guest speaker of the evening. There was a good attendance and a lively discussion of many of the issues presented, particularly the Emergency Maternity and Infant Care program of the Children's Bureau.

Dr. W. F. Cogswell, executive secretary of Montana state board of health, attended two important meetings called by Dr. Parran and the Federal Children's Bureau in Washington on March 20th and the 23rd.

Dr. J. H. Irwin is chief surgeon and Dr. R. B. Ournin, chief of medical service of the first emergency hospital unit in Montana which has been started at Great Falls. The unit was organized with the cooperation of local physicians and the OCD and the U. S. Public Health Service and is affiliated with the Columbus and Deaconess hospitals. The services of the staff will be available in the event of local or regional crisis and may be called upon if an extraordinary military necessity arises.

Lt. Col. Robt. W. DuPriest, army medical corps, formerly at Walter Reed hospital and later at Ft. Lewis, Washington, has been awarded the legion of merit for exceptionally meritorious conduct during the Pearl Harbor attacks. A graduate of the University of Minnesota medical school, 1935, he is the son of Professor John R. DuPriest of the department of mechanical engineering.

Dr. Paul C. Cress, Ellsworth, Minnesota, a first lieutenant in the marine corps, has been ordered to active duty. It is believed that his departure will necessitate the second closing of the Cress Hospital established by his father, Dr. P. J. Cress, now located in California.

Dr. Howard A. Vogel left New Ulm, Minnesota, March 16 to report to the naval base hospital at Corona, California. He enters the service as a lieutenant. Dr. Hjalmar Mortensbak who for the past six years has practiced in Hanska will take over Dr. Vogel's practice during his absence.

Dr. L. W. Anderson, Atwater, Minnesota, was honored by several hundred friends and patients gathered at the high school on March 5th to pay tribute to him when it was learned that failing health would oblige him to retire from active practice. Dr. Anderson, now 61, has practiced in Atwater thirty-six years. Dr. B. J. Branton of Willmar spoke for the medical men in the area.

Dr. H. N. Sutherland, Ely, Minnesota, has been appointed deputy county coroner to fill the vacancy caused by the illness of the present deputy, Dr. P. D. McCarty.

Dr. M. S. Nelson has been appointed chairman of the board of health at Granite Falls, Minnesota. Dr. J. O. Carlson is the new dairy inspector.

Dr. George A. Harmon, surgeon at the veterans' hospital at Ft. William Henry Harrison, Montana, has been appointed a major in the army medical corps, in accordance with the new army ruling that medical and dental personnel of veterans' hospitals, if physically fit and within the age limit, may be commissioned army officers.

The American College of Chest Physicians in the North-Midwest regional district is presenting a program prepared by Dr. Jay Arthur Myers, chairman of Scientific Program committee, in Rochester, Minnesota, on April 15 in connection with the annual meeting of the Minnesota State Medical Society. Members of the college from Minnesota and nearby states were invited to attend this district meeting.

Program:

1. "Practical Points in the Diagnosis of Pulmonary Tuberculosis," Dr. S. A. Slater, F.C.C.P., Medical Director, Southwestern Minnesota Sanatorium, Worthington, Minnesota.

2. "Development of Therapy in Tuberculosis During the Last 25 Years," Dr. John F. Allen, F.C.C.P., Omaha, Nebraska.

3. "Present Status of Chemotherapy in Tuberculosis," Dr. H. C. Hinshaw, Mayo Clinic, Rochester, Minnesota.

4. "'All-Out' Tuberculosis Control by the Medical Profession," Dr. Karl Danielson, Meeker County, Litchfield, Minnesota.

5. "Sarcoidosis," Dr. W. L. Meyer, Medical Director, South Dakota State Sanatorium, Sanator, South Dakota.

6. Case Reports, Dr. L. W. Moody, F.C.C.P., Medical Director, Pureair Sanatorium, Bayfield, Wisconsin.
Luncheon,
Carlton Hotel, Rochester, Minnesota.

"Transitory, Migratory Pulmonary Infiltrations Associated with Eosinophilia," Dr. J. Winthrop Peabody, F.C.C.P., President, American College of Chest Physicians, Washington, D. C.

Dr. Jay Arthur Myers, F.C.C.P., Minneapolis, Minnesota, Chairman, Program Committee. Dr. Karl H. Pfuetze, F.C.C.P., Cannon Falls, Minnesota, Chairman, General Arrangements Committee.

Governors' Committee: Dr. Gustav A. Hedberg, F.C.C.P., Nopeming, Governor for Minnesota, Chairman; Dr. John F. Allen, F.C.C.P., Omaha, Governor for Nebraska; Dr. J. Carl Painter, F.C.C.P., Dubuque, Governor for Iowa; Dr. Carl O. Schaefer, F.C.C.P., Racine, Governor for Wisconsin; Dr. Andrew L. Banyai, F.C.C.P., Regent, Wauwatosa, Wisconsin.

(News Items continued on page 130)

Necrology

Dr. James J. Flynn, 63, Missoula, Montana, died suddenly February 21 at Missoula. He was educated at local schools and at Montana state university. He received his medical degree at Creighton medical college in Omaha. He served as a lieutenant in World War 1.

Dr. O. A. Carmack, 70, Colome, South Dakota, died March 1. One of the early Rosebud doctors, he had practiced in Colome for 25 years.

Captain William Haller, 34, formerly of Bemidji, Minnesota, lately Pueblo, Colorado, flight surgeon, was injured fatally in an automobile accident at Everett, Pennsylvania, on March 1.

Dr. Chester James Sturges, 48, Minneapolis, Minnesota, died in the veterans' hospital on February 23rd. Dr. Sturges received his medical degree from Iowa medical school in 1915.

Dr. Vernon D. Whitaker, 51, Litchfield, Minnesota, died of a heart attack February 9 while with his family in Minneapolis.

Dr. Arthur J. Button, 75, Walker, Minnesota, died February 26th. Dr. Button practiced formerly at Hackensack.

Dr. Robt. Hutchins, 67, St. Paul, formerly of Tomah, Wisconsin, died of a heart attack while driving in an automobile between Minneapolis and Wayzata March 20.

Dr. Marcus Shelander, 61, Minneapolis, died March 8th in veterans' hospital. Veteran of the Philippine insurrection, he had charge of a clinic at St. Mary's hospital, and later operated a laboratory in the city.

Dr. Albert Thompson, 70, St. James, Minnesota, died of a heart ailment in his office March 10th. Dr. Thompson was a graduate of the University of Minnesota and a member of the Watonwan county medical society. He had practiced in St. James for more than 35 years.

Future Meetings

The American Public Health Association announces the Second Wartime Public Health Conference in New York City October 3, 4, 5. The scientific program will be devoted to wartime emergency matters as they affect public health.

The Second War Conference of industrial physicians, industrial hygienists and industrial nurses will be held in St. Louis, Missouri, May 8-14, at the Hotel Jefferson. The participating organizations are (1) American Association of Industrial Physicians and Surgeons, (2) American Industrial Hygiene Association, (3) National Conference of Governmental Industrial Hygienists, and (4) American Association of Industrial Nurses. The medical subjects to be presented include welding in relation to clinical aspects and control of hazards; noise, as to medical phases and means of prevention; better health in small plants; the industrial physicians' opportunity to advance medical knowledge; maladjustment and job environment; women in industry; and panel discussions on "Who Can Work?" and other timely questions. Two clinics, one surgical at Barnes Hospital, and the other medical at Desloge Hospital will be featured among the morning sessions.

The theme of this year's National Hospital Day, May 12, will be "Hospitals in the Third War Year."

The South Dakota State Medical Association will hold its annual meeting, including the Scientific Session at Huron, South Dakota, on May 21, 22, 23.

The 1944 Annual Convention of the North Dakota State Medical Association will be held in Fargo, May 7, 8, and 9. The House of Delegates will hold its first meeting Sunday evening, May 7 and its second meeting Monday morning, May 8.

The scientific program will begin with a round table luncheon on Monday. Papers will be presented Monday afternoon and Tuesday by out of the state physicians, as well as members of the association. There will be several round table luncheons on Tuesday sponsored by special societies. It is likely that the state health officers association will hold its annual meeting Monday morning, May 9. The annual smoker and get-together will close the convention Tuesday afternoon and evening. Out of the state speakers already engaged include Drs. Edward H. Skinner, roentgenologist, Kansas City, Missouri; Henry F. Helmholz, pediatrician, Rochester, Minnesota; H. E. Mickelson, dermatologist, University of Minnesota; L. H. Boies, otolaryngologist, University of Minnesota; Charles M. McLane, obstetrician and gynecologist, New York City.

Negotiations are under way to obtain an outstanding internist and surgeon to present papers in their specialties. Further details of the meeting will be submitted from time to time from the secretary's office.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS
 FEBRUARY 11, 1944
 DECEMBER 20, 21, 22, 1943, EXAMINATION

Name	School	Address
Adams, Forrest Hood	U. of Minn. M.B. 1943	1000 Univ. Ave. S. E., Minneapolis, Minn.
Anderson, Arnold Severen, Jr.	U. of Minn. M.B. 1943	4634 Bruce Ave. S., Minneapolis, Minn.
Anderson, Harold James	U. of Minn. M.B. 1943	771 Geranium Ave., St. Paul, Minn.
Anderson, Milton Winfield	U. of Minn. M.B. 1943	Boston City Hospital, Boston, Mass.
Avrick, Alan Max	U. of Minn. M.B. 1943	1319 Lincoln Ave., St. Paul, Minn.
Bauman, Kenneth Louis	U. of Minn. M.B. 1943	Milwaukee County Hosp., Milwaukee, Wis.
Bergan, Donald Everett	U. of Minn. M.B. 1943	King County Hosp., Seattle, Wash.
Berge, Harry Leroy	U. of Minn. M.B. 1943	2524 - 31st Ave. S., Minneapolis, Minn.
Bergeron, V. Lorel	U. of Minn. M.B. 1943	3901 Thomas Ave. S., Minneapolis, Minn.
Blumenthal, Philip Louis	U. of Minn. M.B. 1943	St. Mary's Hosp., Minneapolis, Minn.
Boom, Gaylord Willis	U. of Minn. M.B. 1943	Detroit Receiving Hosp., Detroit, Mich.
Brickley, Paul Michael	U. of Minn. M.B. 1943	St. Luke's Hosp., Chicago, Ill.
Brimi, Robert John	U. of Minn. M.B. 1943	Eloise Hosp. & Infirmary, Eloise, Mich.
Burseth, Edgar Carlyle	U. of Minn. M.B. 1943	535 Asbury, Apt. 1, St. Paul, Minn.
Carlander, Lester William, Jr.	U. of Minn. M.B. 1943	4227 Harriet Ave. S., Minneapolis, Minn.
Christensen, Mentor Halfdan	U. of Minn. M.B. 1943	St. Mary's Hosp., Duluth, Minn.
Covey, Kenneth Wilbur	U. of Minn. M.B. 1943	920 S. 7th St., Minneapolis, Minn.
Craven, James Patrick	Loyola M.D. 1943	Williston, N. D.
Dale, Lester N.	U. of Minn. M.B. 1943	St. James, Minn.
Dargay, Cyril Paul	Marquette M.D. 1943	1401 N. E. University, Minneapolis, Minn.
Dougherty, John Wallace	U. of Minn. M.B. 1943	U. S. Marine Hosp., Staten Island, N. Y. C.
EGGE, Sanford Granger	U. of Minn. M.B. 1943	King County Hospital, Seattle, Wash.
Enquist, Irving Fritiof	U. of Minn. M.B. 1943	St. Mary's Hospital, Minneapolis, Minn.
Fee, John Gifford	U. of Minn. M.B. 1943	St. Mary's Hospital, Duluth, Minn.
Feigal, William Max	U. of Minn. M.B. 1943	1903 Columbus Ave., Minneapolis, Minn.
Ferrell, Clarence Richard	U. of Minn. M.B. 1943	Bethesda Hospital, St. Paul, Minn.
Firestone, George Maurice	U. of Minn. M.B. 1943	1866 Portland Ave., St. Paul, Minn.
Gamble, Alice Hawthorne	U. of Minn. M.B. 1943	John Sealy Hospital, Galveston, Texas
Gericke, Julius Theodore, Jr.	Marquette M.D. 1943	123 W. Summit Ave., St. Paul 2, Minn.
Gibbs, Robert William	U. of Minn. M.B. 1943	Presbyterian Hospital, Chicago, Ill.
Griess, Donald Ferdinand	U. of Neb. M.D. 1942	Irwin Apt. 29, 23 - 7th Ave. S. W., Rochester, Minn.
Halme, William B.	U. of Minn. M.B. 1943	St. Mary's Hospital, Detroit, Mich.
Hodgson, John Robert	U. of Mich. M.D. 1940	Mayo Clinic, Rochester, Minn.
Hohm, Paul Harrold	U. of Chicago M.D. 1943	Ancker Hospital, St. Paul, Minn.
Horns, Howard L.	U. of Minn. M.B. 1943	142 Arthur S. E., Minneapolis, Minn.
Hruza, William John	U. of Minn. M.B. 1942	2615 Park Ave., Minneapolis, Minn.
Johnson, Carl Laurence	U. of Minn. M.B. 1943	U. S. Naval Hosp., Great Lakes, Ill.
Johnson, Edward Alfred	U. of Minn. M.B. 1943	Truman, Minn.
Johnson, Kenneth Joseph	U. of Minn. M.B. 1943	Seymour Hospital, Eloise, Mich.
Johnson, Paul Raymond	U. of Minn. M.B. 1943	Hosp. of Good Samaritan, Los Angeles, Calif.
Johnson, Reinald Gustav	U. of Minn. M.B. 1943	Bethesda Hospital, St. Paul, Minn.
Kaliher, Howard	U. of Minn. M.B. 1943	800 - 4th St. S. E., Minneapolis 14, Minn.
Kelley, Kenneth John	U. of Minn. M.B. 1943	Swedish Hospital, Minneapolis, Minn.
Kleifgen, George Van Horn	U. of Minn. M.B. 1943	Mayo Clinic, Rochester, Minn.
Knudsen, Helen L.	U. of Minn. M.B. 1943	500 S. E. Harv'd, Apt. 11, Minneapolis, Minn.
Kueffner, William Robert	U. of Minn. M.B. 1943	Route 4, Rockville, Md.
Lagaard, Sheldon Miller	U. of Minn. M.B. 1943	3608 - 19th Ave. S., Minneapolis, Minn.
Lehman, Samuel John	U. of Minn. M.B. 1943	4001 N. Dupont Ave., Minneapolis, Minn.
Litman, Neil Norman	U. of Minn. M.B. 1943	Detroit Receiving Hosp., Detroit, Mich.
Litman, Robert Elkon	U. of Minn. M.B. 1943	Kings County Hospital, Brooklyn, N. Y.
Lober, Paul Amoor Hallam	U. of Minn. M.B. 1943	4012 W. 44th St., Minneapolis, Minn.
Lynch, James Leo	U. of Minn. M.B. 1943	Mpls. General Hospital, Minneapolis, Minn.
Mallette, Lester Birch	Northwestern M.B. 1943	Ancker Hospital, St. Paul, Minn.
Martin, Frank Edgerton	U. of Minn. M.B. 1943	70 S. 12th St., Minneapolis, Minn.
McAdams, John Brennan	U. of Minn. M.D. 1943	1105 W. 7th St., St. Paul 2, Minn.
Merner, Thomas Borden	U. of W. Ont. M.D. 1937	1820 - 4th St. S. E., Minneapolis, Minn.
Miller, Zondal Ronald	U. of Minn. M.B. 1943	307 - 1st Ave. N., Chisholm, Minn.
Mudgett, Roxie Tyler	U. of Minn. M.B. 1943	Illinois Research Hospital, Chicago, Ill.
Nelson, Alfred Sidney	U. of Minn. M.B. 1943	Ancker Hospital, St. Paul, Minn.
Nesset, William Dean	U. of Minn. M.B. 1943	Milwaukee County Hosp., Milwaukee, Wis.
Norum, Henry Alvin	U. of Minn. M.B. 1943	1741 Lincoln Ave., St. Paul, Minn.
Orr, Burton Allyn	U. of Minn. M.B. 1943	Detroit Receiving Hosp., Detroit, Mich.
Petersen, Glenn Llewellynn	U. of Minn. M.B. 1943	Baltimore City Hospitals, Baltimore, Md.
Petters, Robert John	U. of Minn. M.B. 1943	Buffalo General Hosp., Buffalo, N. Y.
Regan, John James	U. of Minn. M.B. 1943	St. Mary's Hospital, Duluth, Minn.
Rieman, Robert William	U. of Minn. M.B. 1943	Milwaukee County Hosp., Milwaukee, Wis.
Rockwell, Curtiss V.	U. of Minn. M.B. 1943	2878 Holmes Ave. S., Minneapolis, Minn.
Rockwood, Philo Harvey	U. of Minn. M.B. 1943	Ball Memorial Hospital, Muncie, Ind.
Rogin, Norton	U. of Minn. M.B. 1943	Queens General Hosp., Jamaica, L. I., N. Y.
Rothnem, Morris Stanley	U. of Minn. M.B. 1943	2733 Portland Ave., Minneapolis, Minn.
Rotnem, Orville Morris	U. of Minn. M.B. 1943	Milwaukee County Hosp., Milwaukee, Wis.
Ryding, Vincent Theodore M.	U. of Kans. M.D. 1942	Starbuck, Minn.

Name	School	Address
Sanderson, David John	U. of Minn. M.B. 1943	U. S. Naval Hosp., Seattle, Wash.
Sborov, Victor Max	U. of Minn. M.B. 1943	2829 Portland Ave. S., Minneapolis, Minn.
Seebach, Lydia Marie	U. of Minn. M.B. 1943	Kings County Hospital, Brooklyn, N. Y.
Shaffer, John Ordie	U. of Minn. M.B. 1943	Philadelphia General Hosp., 34th & Curie Ave., Philadelphia, Pa.
Shapiro, Marvin James	U. of Minn. M.B. 1943	220 W. Minnehaha Pkwy., Minneapolis, Minn.
Sheehan, John Richard	U. of Minn. M.B. 1943	1212 Shatto St., Los Angeles, Calif.
Simmonds, Harry Norman Louis	U. of Minn. M.B. 1943	1562 N. Hamline Ave., St. Paul, Minn.
Skorneck, Alan Bernard	U. of Minn. M.B. 1943	Queens General Hosp., Jamaica, L. I., N. Y.
Smith, Clyde Leroy	U. of Minn. M.B. 1943	3814 Bloomington Ave. S., Minneapolis, Minn.
Stapp, John Paul	U. of Minn. M.B. 1943	St. Mary's Hospital, Duluth, Minn.
Templeton, Helene Mae	U. of Minn. M.B. 1943	St. Barnabas Hospital, Minneapolis, Minn.
Trow, William Howard	U. of Minn. M.B. 1943	310 E. 22nd St., Minneapolis, Minn.
Truesdale, Clark Wells	U. of Minn. M.B. 1943	Chas. T. Miller Hospital, St. Paul, Minn.
Turbak, Charles Elroy	U. of Minn. M.B. 1943	Lincoln Hosp., 320 Concord Ave., Bronx 54, New York
Vadheim, Robert Harold	U. of Minn. M.B. 1943	Tyler, Minn.
Van Cleve, Horatio Phillips, Jr.	U. of Minn. M.B. 1943	3248 Park Ave., Minneapolis, Minn.
Van Ryzin, Donald John	U. of Minn. M.B. 1943	Detroit Receiving Hosp., Detroit, Mich.
Walstad, Paul Marion	U. of Minn. M.B. 1943	Hosp. of Good Samaritan, 1212 Shatto, Los Angeles, Calif.
Watson, Robert McLean	U. of Minn. M.B. 1943	149 Summit Ave., St. Paul 2, Minn.
Wilcox, G. Charles	U. of Minn. M.B. 1943	Miller Hospital, St. Paul, Minn.
Yordy, Frank Scribner	U. of Wis. M.D. 1943	Ancker Hospital, St. Paul, Minn.
Zarling, Virgil Richard	U. of Minn. M.B. 1943	Baltimore City Hosp., Baltimore, Md.
JANUARY 18, 19, 20, 1944, EXAMINATION		
Burns, Catherine	U. of Minn. M.B. 1943	University Hospital, Minneapolis, Minn.
Ciaramelli, Letizia Carmela	N. Y. Med. Coll. M.D. 1942	Box 37, Mayo Clinic, Rochester, Minn.
Cochran, Hiram Dee	U. of Tenn. M.D. 1941	Mayo Clinic, Rochester, Minn.
Guerin, Briant Bowman	Duke M.D. 1941	Mayo Clinic, Rochester, Minn.
Hall, Arthur Martin	U. of Minn. M.B. 1943	3136 - 10th Ave. S., Minneapolis, Minn.
Kusske, Douglas Raymond	U. of Minn. M.B. 1943	Swedish Hospital, Minneapolis, Minn.
Lane, Margaret Mary	U. of Illinois, M.D. 1943	8520 Watertown Plank Rd., Milwaukee 13, Wis.
Merrick, Charlotte Teschan	U. of Minn. M.D. 1943	1500 Chicago Ave., Minneapolis, Minn.
Nord, Robert Edward	U. of Minn. M.B. 1943	1453 Medical Arts Bldg., Minneapolis, Minn.
Pyle, Marjorie McDonald	U. of Kans. M.D. 1940	Mineral Springs San., Cannon Falls, Minn.
Smith, Arthur Lawrence, Jr.	Rush M.D. 1940	Mayo Clinic, Rochester, Minn.
Steves, Richard Jerome	Northwestern M.D. 1937	2107 Pleasant Ave., Minneapolis, Minn.
Wallen, John Walfred, Jr.	U. of Oregon M.D. 1943	Ancker Hospital, St. Paul, Minn.
BY RECIPROCITY		
Schneider, Lawrence Edward	U. of Colo. M.D. 1929	258 W. 6th St., Erie, Pa.
Hunt, Wallace Daniel	Northwestern M.D. 1927	401 City Hall, Minneapolis, Minn.
Stuart, Robert Leo	U. of Neb. M.D. 1942	Mayo Clinic, Rochester, Minn.
Devine, Kenneth Daniel	State U. of Iowa M.D. 1941	112 - 11th St. S. E., Rochester, Minn.
BY NATIONAL BOARD CREDENTIALS		
Young, Bascom Brockenbrough	U. of Va. M.D. 1929	1026 Medical Arts Bldg., Duluth, Minn.

NEWS ITEMS (Continued from page 128)

Dr. William A. O'Brien, director of postgraduate medical education at the University of Minnesota, was re-elected president of the Minnesota Society for the Control of Cancer at its annual meeting on the campus.

Dr. G. E. Galligan, Winona, Minnesota, physical education director of the state teachers college, was re-elected to the executive committee of the Central district association for health, physical fitness and recreation at a recent meeting at Topeka, Kansas.

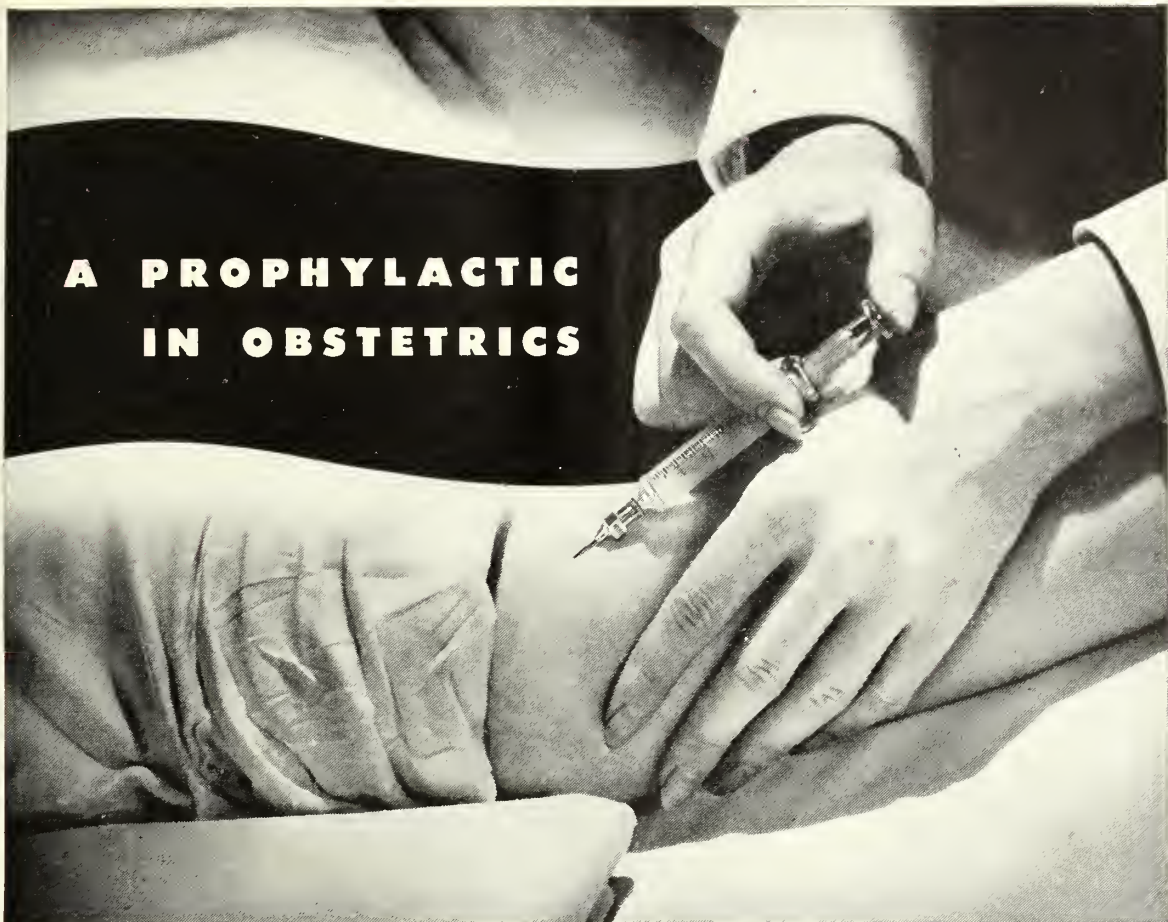
Dr. Chester W. Lawson of Glasgow, Montana, has returned to the Smith Clinic after four exciting and dramatic years, spent mostly in China, during which he was head of the department of obstetrics in Hacket Medical Center in Canton until interned by the Japanese in 1942. The following year he and his wife and son were among those United Nationals released by the Japanese to be exchanged for their own nationals, and returned to this country on the Gripsholm last December.

The Sixth district medical society of South Dakota held a meeting at the Methodist state hospital, Mitchell, March 2. A very interesting paper entitled, "Medical Aspects of Recent Advances in Protein in Chemistry" was presented by Dr. Edwin H. Shaw, Jr., Ph.D., professor of biochemistry of the University of South Dakota, Vermillion.

Cleveland city hospital has admitted to date 21 negro interns and reports favorably on its experience. Notable was the lack of undue friction between white and negro personnel and the willingness of white patients to be treated by negro doctors. Several of the negro interns have been advanced to the highest positions on the house staff.

Dr. John J. Stratte of Grand Forks, North Dakota, has gone to Kenmare to be associated with Dr. D. J. Halliday. He previously practiced in Warren, Minn. Dr. Stratte took his internship at St. Paul's Ancker Hospital, after graduating from Rush Medical School.

(Continued on page 132)



**A PROPHYLACTIC
IN OBSTETRICS**

**A ROUTINE MEASURE
TO PREVENT
NEONATAL HEMORRHAGE**



Hemorrhagic disorders in the newborn can be strikingly reduced by the administration of vitamin K to mothers during labor. Synkayvite, the Roche vitamin K-compound, is the choice of many physicians for routine prophylactic vitamin K therapy because of its all-round therapeutic efficiency. Molecule for molecule, it is one and one-half times as active as natural vitamin K, yet relatively nontoxic. Supplied in oral tablets, 5 mg each; and ampuls, 1 cc, 5 mg or 10 mg each.

HOFFMANN-LA ROCHE, INC., NUTLEY, NEW JERSEY

SYNKAYVITE 'ROCHE'

BOOK REVIEWS (Continued from page 126)

The Development of the Sciences, Second Series, by OYSTEIN ORE, Ph.D.; FRANK SCHLESINGER, Ph.D., Sc.D.; HENRY MORGENAU, Ph.D.; JOHN ARREND TIMM, Ph.D.; CHESTER RAY LONGWELL, Ph.D.; LORANDE LOSS WOODRUFF, Ph.D.; WALTER RICHARD MILES, Ph.D., and JOHN FARQUHAR FULTON, M.D., Ph.D.; edited by LORANDE LOSS WOODRUFF, Ph.D.; green cloth, gold-stamped, 316 pages plus bibliography of 9 pages and index of 10 pages; frontispiece; New Haven, Yale University Press, 1941. Price \$3.00.

There are only two full-time chairs of the history of science in the United States, so far as the reviewer is aware. One is occupied by the fine scholar who is also editor of *Isis*, journal of the history of science, Dr. George Sarton of Harvard University. The other may be viewed with unalloyed pride by scholars and persons interested in the history of science and medicine in Minnesota and the Northwest, for it is held by Dr. Richard E. Scammon, of the Graduate School of the University of Minnesota. In his seminars research work in the history of science and medicine is carried out under his direction continually, and some of it has been published in journals devoted to or interested in the field. Mention should be made also of the brilliant work of another Minnesota man, Dr. Herbert Feigl, of the University of Minnesota, an editor of the journal, *The Philosophy of Science*, whose graduate teaching in the philosophy of science has brought eminence in this field to the institution which he serves.

But, since the field itself is so new, and since in most American universities the subject itself is not offered, the publication of volumes concerned with the history of science is a notable service. The exhaustive *History of Magic and Experimental Science* of Dr. Thorndike, sponsored by the History of Science Society; the great *Introduction to the History of Science* of Dr. Sarton; the Johns Hopkins University series in the history of medicine, and the several "source books" in the history of science that have been published since 1929 by the American Association for the Advancement of Science, are examples.

The present volume is a continuation of the volume of the same title, edited by the same man, which was issued at Yale in 1923. That volume is now known as "first series." The present volume is called "second series." Only two contributors to the "first series," Dr. Schlesinger and Dr. Woodruff, are also contributors to the "second series."

The book is not pretentious, and is not offered as a piece of research. Each contributor is a professor in Yale University, and has written a short, succinct, essay of opinion on the development of his own branch of science. Some chapters have annotations; others have not. Dr. Ore writes on mathematics, Dr. Schlesinger on astronomy, Dr. Morgenau on physics, Dr. Timm on chemistry, Dr. Longwell on geology, Dr. Woodruff on biology, Dr. Miles on psychology, and Dr. Fulton, a Minnesota man of uncommon distinction in the history of medicine, writes on medicine and the sciences.

The Microscope and Its Use, by FRANK J. MUNOZ, Technical Microscope Consultant, and HARRY J. CHARIPPER, Ph.D., Professor of Biology, New York University; Brooklyn, Chemical Publishing Co., 334 pages, 129 illustrations, 1943, \$2.50.

This monograph should be of considerable aid to the physician, medical student, and laboratory technician in eliminating problems in microscopy. It is lucid and practical in its descriptions of the methods which can be used to get the utmost in diagnosticability on any microscope.

In addition to short sections on the history and evolution of microscopy, the authors include detailed descriptions of various microscopes, including stereoscopic, metallurgical, and polarizing types. They simplify technical microscopic optics into non-technical language.

The subject of illumination, which is usually neglected by the average microscopist, is thoroughly covered, with helpful hints for the improvement of results.

The dark field examination is described in detail and this instruction should prove useful to any physician interested in its use.

NEWS ITEMS (Continued from page 130)

At the annual election of officers of the Association of Fellows in the Mayo Foundation, Dr. Richard M. Nay, former secretary, was named president. Other officers are Dr. J. J. Manning, vice-president, and Dr. L. P. Hoyer, secretary.

Reuben C. Idstrom, who for the past two and a half years has been assistant superintendent of the Swedish Hospital in Minneapolis, has become superintendent of Rice Memorial Hospital at Willmar, Minnesota.

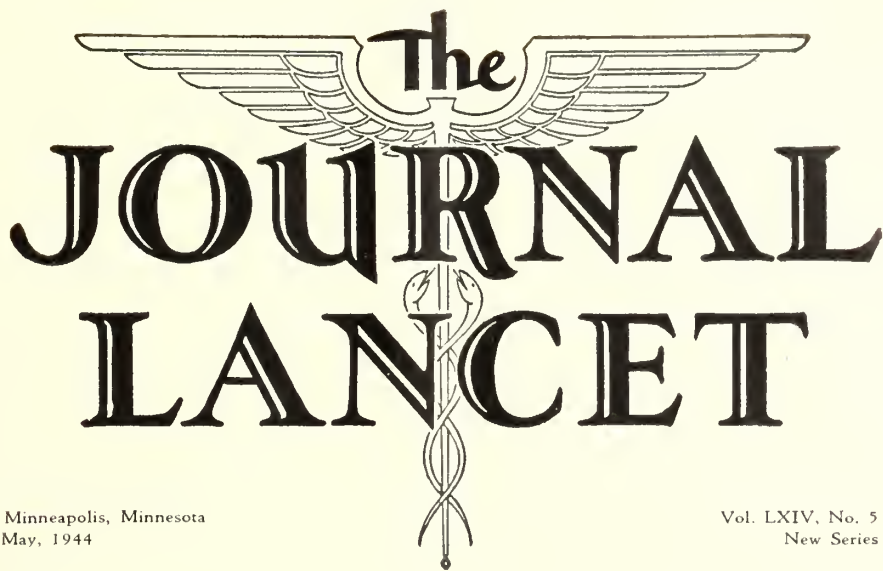
Dr. Samuel Saunders Steinberg, a member of the Butte, Montana, Clinic where he specialized in radiology, has been commissioned an Army captain and is undergoing special training at Carlisle Barracks, Pa., after which he will be stationed as a radiologist at a base hospital in South Carolina. After graduating with honor at the University of Louisville School of Medicine, he spent five years in postgraduate training at the University of Michigan and University of Iowa hospitals. He came to Butte in 1935, and has published numerous important articles, one of which, on irradiation sickness, received world-wide distribution.

Dr. Arthur James Movius, Jr., of Billings, Mont., has received his orders to be ready to report for active duty as a first lieutenant in the medical corps. Dr. Movius is a graduate of the Northwestern University Medical School and spent three years in surgical work at the Mayo Clinic after completing his internship. He has been connected with the Billings Clinic for the past two and a half years.

Dr. Hazel Freed of Stanford, Montana, has been elected president of the Fergus County Medical Society. Other officers elected are: Dr. J. J. Elliott, vice president; Dr. F. F. Attix, secretary-treasurer; Dr. C. W. Wilder, delegate to the state medical association convention; and Dr. Elliott, alternate delegate.

The state of Michigan has put into effect a free blood plasma service for all physicians in the state, by which the vital plasma is now available to all medical men without regard to the patient's ability to pay. The blood, procured from donors through locally-sponsored donation clinics, is processed at the health department's Lansing laboratories and distributed for storage throughout the state against the day of its eventual use. The initial number of units of plasma credited to a participating community is determined by the donor response therein. The community is credited with the yield from its donors and debited a small amount reserved for OCD and state emergency use. Thereafter replacement schedules are maintained on the basis of receipts from physicians showing the amounts used.

Mother Bickerdyke, a graduate nurse, heroine of the Civil War, will be memorialized by having a veterans' hospital at Galesburg, Illinois, named after her. She is the paternal grandmother of Mrs. Margaret Beckman, of Lead, South Dakota, and her sister, Mrs. A. J. Waterland of Central City. Mother Bickerdyke was reared by her Grandfather Ball, renowned for his Revolutionary War exploit of remaining behind at the battle of Trenton to keep deceptive camp fires burning to cover the retreat of General George Washington with his troops.



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CHILD HEALTH DAY--1944

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA
A Proclamation

WHEREAS, the Congress by joint resolution of May 18, 1928 (45 Stat. 617), has authorized and requested the President of the United States to issue annually a proclamation setting apart May 1 as Child Health Day:

NOW, THEREFORE, I, FRANKLIN D. ROOSEVELT, President of the United States of America, in recognition of the importance to every child and young person of a healthy body and a sturdy spirit, do hereby designate May 1 of this year as Child Health Day.

And I invite our boys and girls to use this occasion as a time to gather with parents, teachers, and other citizens, or by themselves, in schools, churches, and community centers, and to consider how we can make our home and community life contribute in full measure to the building of buoyant health and valiant spirit in all our boys and girls.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States of American to be affixed.

DONE at the City of Washington this seventeenth day of March in the year of our Lord nineteen hundred and forty-four and of the Independence of the United States of America the one hundred and sixty-eighth.

(SEAL)

FRANKLIN D. ROOSEVELT

By the President:
CORDELL HULL
Secretary of State

Types of Congenital Heart Diseases in 15,597 Autopsies*

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Minneapolis, Minnesota

IN the 15,597 autopsies performed in the Department of Pathology at the University of Minnesota during the years 1936-41, one hundred and forty-one cases of congenital heart deformities were found. The anomalies present were due for the most part to an arrested or irregular embryological development of the heart or aortic arches.

The primitive heart is a tube composed of four parts; the bulbus, ventricle, atrium and sinus venosus. The bulbus develops into the aortic conus, the pulmonary conus and the aortic and pulmonary valves. (Developmental disturbances in the bulbus are common.) The ventricle and atrium form the respective cavities in the mature heart. The sinus venosus develops into the superior and inferior vena cava.

Of the six aortic arches, only two, the fourth and sixth, have any significance in the development of congenital heart anomalies. The right fourth forms the innominate artery and part of the right subclavian. The left fourth develops into the aortic arch. The sixth gives rise to the pulmonary arterial trunk on the right and to the ductus arteriosus on the left. The critical period in development is between the fifth and eighth weeks of fetal life.

Three embryological processes, septal formation, rotation and torsion and adjustment of the fourth and sixth aortic arches, must be considered in interpreting the vast number of anomalies possible.

Seven types of abnormalities are considered in this report: (1) disturbance in the formation of septa; (2) disturbance in rotation and torsion; (3) disturbance in the adjustment of the aortic arches; (4) valvular deformities; (5) primary changes in atria or ventricles; (6) pericardial defects and (7) coronary artery defects.

Of our cases congenital hearts comprised 9.04 per thousand deaths. Females predominated slightly (8.02 males per thousand male, and 10.78 females per thousand female autopsies). It is to be noted that most of the cases died in the first decade. Eight-seven per cent were stillbirths or died in the first two decades. It is obvious why in an autopsy series the incidence of congenital heart diseases differs from the total incidence or incidence of types in a clinical series.

The relative frequency of the different types of congenital hearts met is shown in the following tables.

In Table 1 the total incidence and the incidences of males and females per thousand autopsies are tabulated. In Table 2 the types due to disturbance of septal formation are recorded. There are 76 cases (53.9 per cent of the entire series) which have been broken down as follows: (1) Persistent truncus arteriosus; this occurs when the common aortic trunk fails to divide into the aorta and the pulmonary artery. The persistent truncus

*From the Department of Pathology, University of Minnesota Medical School.

TABLE 1
Congenital Hearts in 15,597 Autopsies (1936-41), 141 cases.
Age and Sex.

Decade	Males (79)			Females (62)			Total (141)		
	Autopsies	No.	M.	Autopsies	No.	M.	Autopsies	No.	M.
SB*	791	11	13.90	619	6	9.69	1410	17	12.05
1.	1143	50	43.74	821	51	62.11	1964	101	51.42
2.	267	4	14.98	195	1	5.12	462	5	10.82
3.	449	5	11.13	369	2	5.42	818	7	8.55
4.	643	3	4.66	469	1	2.13	1112	4	3.59
5.	1215	1	0.82	599	1	1.66	1814	2	1.10
6.	1731	2	1.15	759			2490	2	0.80
7.	1682	2	1.18	851			2533	2	0.78
8.	1423	1	0.70	779			2202	1	0.45
9.	477			265			742		
10.	28			22			50		
Total	9849	79	8.02	5748	62	10.78	15597	141	9.04

*Stillbirths

TABLE 2
Disturbance in Formation of Septa, 76 Cases, 53.9 per cent.

Types	Per cent of No. Total	Ages in decades										
		SB	1	2	3	4	5	6	7	8	9	
1. Persistent truncus arteriosus	6 4.3	2	4	-	-	-	-	-	-	-	-	-
2. Atrial septal defect	4 2.8	1	2	-	1	-	-	-	-	-	-	-
3. Ventricular septal defect	37 26.2	6	29	1	1	-	-	-	-	-	-	-
4. Septal defects (special)	16 11.3	2	10	1	2	-	-	-	1	-	-	-
(a) Lutembacher's disease	3 2.1	-	-	-	2	-	-	-	1	-	-	-
(b) Cor biloculare	6 4.3	1	4	1	-	-	-	-	-	-	-	-
(c) Cor triloculare biatriatum	7 4.9	1	6	-	-	-	-	-	-	-	-	-
5. Septal defects with certain other combined defects	13 9.2	2	10	-	1	-	-	-	-	-	-	-
(a) Tetralogy of Fallot	9 6.3	1	7	-	1	-	-	-	-	-	-	-
(b) Eisenmenger's disease	4 2.8	1	3	-	-	-	-	-	-	-	-	-

usually arises from the right ventricle, but may over-ride both ventricles. All have ventricular septal defects. Cyanosis is extreme. The right ventricle hypertrophies and fails. Two were stillbirths and all the other four died within the first year of life.

(2) In four cases death apparently was due primarily to an atrial septal defect. One was a stillbirth, two died in the first decade, and one lived into the fourth decade. Atrial septal defects, to a slight degree, relatively frequent, are found in about 20 per cent of autopsies, but it is seldom that a patent foramen ovale is sufficiently wide to bring about cardiac failure, unless there are associated defects. With an atrial septal defect, the blood is shunted from the left to the right atrium. The minute volume in the pulmonary circuit is increased. Due to the increased work, the right ventricle hypertrophies and fails. Cyanosis occurs only at the terminal stage.

(3) There were 37 cases (26.2 per cent) of ventricular septal defect. This is the most common type of congenital heart. Six were stillbirths. Of the 29 who died in the first decade, 28 died during the first year. Only two lived to be ten years old. The right ventricle hypertrophies and dilates. Cyanosis occurs only as a terminal condition.

TABLE 3

Disturbance in Rotation and Torsion, 8 Cases, 5.7 per cent.

Types	Per cent of No. Total		Ages in decades										
			SB	1	2	3	4	5	6	7	8	9	
1. Transposition of arterial trunks	8	5.7	-	8	-	-	-	-	-	-	-	-	-
(a) with closed ventricular septum	4	2.8	-	4	-	-	-	-	-	-	-	-	-
(b) with ventricular septal defect	4	2.8	-	4	-	-	-	-	-	-	-	-	-

(4) In one group of special septal defects other defects are associated.

(a) In Lutembacher's disease an atrial septal defect is associated with an acquired mitral insufficiency or stenosis. The strain upon the right heart is greater than that resulting from a pure atrial septal defect. Cyanosis does not occur since the shunt is arteriovenous. There were three of this type. Two died in the fourth decade and one in the seventh.

(b) Cor biloculare is a type of congenital heart in which both atrial and ventricular septa are almost or completely absent. There were six of this type. All died before the 20th year. One lived to be 19, and died from other causes. The heart was not enlarged. Cyanosis is marked in the group.

(c) In cor triloculare biatriatum there is complete absence of the ventricular septum. Cyanosis is marked. There were seven of this type. One was a stillbirth and six died in the first decade, all in the first year.

(5) A group of ventricular septal defects commonly associated with certain other combined defects.

(a) The tetralogy of Fallot includes a combination of anomalies. Three are primary. These are pulmonary stenosis (bulbus anomaly), interventricular septal defect (disturbance in septal formation), and dextroposition of the aorta (disturbance of rotation and torsion). The fourth pathological condition in the tetrad, right ventricular hypertrophy, is secondary to the three primary defects. Cyanosis is marked. The right heart fails. There were nine of this type, 6.3 per cent. One was a stillbirth, seven died in the first decade, and one in the third.

(b) The Eisenmenger's type has the same combination of defects as the tetralogy of Fallot with the exception of the pulmonary stenosis. The absence of the stenosis demonstrates that the ventricular septal defect is not a necessary anomaly. Cyanosis is marked and death follows right heart hypertrophy with failure. There were four cases in this group. One was a stillbirth and three died in the first decade, all under six months.

Table 3 lists the cases of congenital hearts due to disturbance in rotation and torsion of the embryonic heart.

(1) In these the arterial trunks are transposed. The aorta comes from the right ventricle and the pulmonary artery from the left ventricle. A septal defect or a patent ductus arteriosus is necessary for life. The right ventricle because of increased work becomes hypertrophied and fails. Cyanosis is marked.

(a) with closed ventricular septum, four cases (2.8 per cent). All died in the first decade, two under six months.

(b) with ventricular septal defect, four cases (2.8 per

TABLE 4

Disturbance in Adjustment of Aortic Arches, 31 Cases, 21.9 per cent.

Types	Per cent of No. Total		Ages in decades										
			SB	1	2	3	4	5	6	7	8	9	
1. Coarctation of the aorta	25	17.7	3	17	-	4	1	-	-	-	-	-	-
(a) Infantile type	19	13.5	2	17	-	-	-	-	-	-	-	-	-
(b) Adult type	6	4.2	1	-	-	4	1	-	-	-	-	-	-
2. Patent ductus arteriosus	6	4.3	-	3	1	-	-	1	1	-	-	-	-

cent). All of these died in the first decade, all under one year.

In Table 4 are the cases in which the anomalies are the result of maladjustment of the aortic arches.

(1) Coarctation of the aorta results from improper development of the fourth left aortic arch and occurs as two types, the infantile and adult.

(a) The infantile type is rarely seen clinically, but in a series of autopsies where stillbirths are included, this type is more common than the adult type. In the infantile type, there is a narrowing of the entire isthmus of the aorta, that is, the arch between the ductus arteriosus and the left subclavian artery. Death usually occurs soon after birth or within a few months, because an adjusted circulation cannot be made after birth with sufficient rapidity to meet the circulatory requirements. Of this type in our series, there were 19 (13.5 per cent). Two were stillbirths, and 17 died in the first decade, all under five months.

(b) The adult type has a constricted area of the aorta just below or distal to the ductus arteriosus. The ductus seldom remains patent. Collateral circulation develops between the internal mammaries and the intercostals. The arch of the aorta is usually greatly dilated. Sometimes it may rupture. The left ventricle becomes enlarged and fails as in hypertensive hearts. The condition may persist for many years. Abbott¹ reported a case which lived to be 92 years old. Cyanosis is not normally present. In our series of 141, there were six cases of the adult type, 4.2 per cent. One was a stillbirth. Four died in the third decade and one in the fourth.

(2) The type of congenital heart called patent ductus arteriosus results from lack of development of thickened mounds² within the wall of the ductus and a consequent failure of closure. The improperly developed arch is the left sixth. Hypertrophy occurs in both ventricles; in the left it is due to increased minute volume output; in the right it is due to increased pressure and volume in the pulmonary artery. A terminal cyanosis is present. There were six cases of patent ductus arteriosus, 4.3 per cent. Three died in the first decade, one in the second, one in the fifth and one in the sixth.

The cases in which congenital valvular deformities were found are grouped in Table 5.

(1) Aortic valve or orifice deformity was present in seven of the 18 cases (5 per cent). One had four aortic cusps and lived to be 76 years old. There were bicuspid aortic valves in two cases whose ages were 38 and 46 respectively. In one of these death appeared to be due to the valve deformity. Stenosis was present in two, one of whom died at four days and the other at eight years.

TABLE 5
Valvular Defects, 18 Cases, 12.8 per cent.

Types	Per cent of No. Total		Ages in decades										
			SB	1	2	3	4	5	6	7	8	9	
1. Aortic.....	7	5.0	-	4	-	-	1	1	-	-	1	-	-
2. Mitral.....	3	2.1	1	1	-	-	-	-	-	1	-	-	-
3. Tricuspid.....	4	2.8	-	3	-	1	-	-	-	-	-	-	-
4. Pulmonary.....	4	2.8	-	4	-	-	-	-	-	-	-	-	-
(a) without septal defects	2	1.4	-	2	-	-	-	-	-	-	-	-	-
(b) with atrial septal defect	1	0.7	-	1	-	-	-	-	-	-	-	-	-
(c) with both atrial and ventricular septal defects	1	0.7	-	1	-	-	-	-	-	-	-	-	-

Atresia of the aortic orifice occurred in two, of whom one lived but one day, the other four days.

(2) There were only three with mitral valve deformities (2.1 per cent). Two had stenosis of the valve. Of these, one was a stillbirth and the other lived for nine months. The third case had deformed cusps and multiple chordae tendinae. Mitral insufficiency resulted. This patient died suddenly at 54.

(3) Four cases of tricuspid deformity were observed. One had two cusps with low attachments and lived to be 21 years old. One had two cusps fused and died on the second day of life. There was stenosis in one who lived for one and one-half years. Atresia was present in one. Death occurred at two months.

(4) Stenosis or atresia of the pulmonary valve or orifice resulting from a maldevelopment of the bulbous is a fairly frequent anomaly, occurring either independently or with other defects. In addition to the cases described in the tetralogy of Fallot there were four (2.8 per cent).

(a) Two had no septal defects. Both died in the first decade.

(b) One had an atrial septal defect and lived but one month.

(c) One had both atrial and ventricular septal defects and lived only a month.

In these cases there is hypertrophy of the right ventricle and cyanosis is usually marked although this is less if a ventricular septal defect is present.

In Table 6, there is a small group of congenital anomalies consisting of *primary changes in atria or ventricles*, *pericardial defects*, and *coronary artery anomalies*.

(1) Five (3.5 per cent) of the above eight cases were grouped as congenital idiopathic hypertrophy. The actual existence of this condition is doubtful. The increase in heart weight, in most cases, appears to be due to replacement fibrosis of muscle and subendocardial tissue and not to actual muscular hypertrophy. A cardiac enlargement at times is due to deposits of glycogen in the heart

TABLE 6
Primary Changes in Atria or Ventricles (Six Cases, 4.3 per cent); Pericardial Defects (One Case, 0.7 per cent); Coronary Arterial Defects (One Case, 0.7 per cent).

Types	Per cent of No. Total		Ages in decades										
			SB	1	2	3	4	5	6	7	8	9	
1. Congenital idiopathic myocardial hypertrophy	5	3.5	-	5	-	-	-	-	-	-	-	-	-
2. Congenital dilatation of right ventricle.....	1	0.7	-	-	1	-	-	-	-	-	-	-	-
3. Pericardial defect.....	1	0.7	1	-	-	-	-	-	-	-	-	-	-
4. Coronary arterial defect.....	1	0.7	-	-	1	-	-	-	-	-	-	-	-

muscle (von Gierke's disease). All of the five died in the first decade, four under one year.

(2) In one, there was a marked dilatation of right ventricle without any visible cause.

(3) In one the heart lay outside an open pericardium.

(4) There was one case of congenital coronary artery defect. This was a boy of ten who died suddenly with symptoms of a typical coronary attack. There was a complete atresia of the left coronary orifice. The heart was not enlarged. The left coronary artery may arise from the pulmonary artery. This is commonly associated with the so-called idiopathic congenital cardiac hypertrophy. The association with the hypertrophy appears to be coincident and not causal.

SUMMARY

Congenital heart diseases comprise 9.04 per thousand autopsies. The incidence is slightly greater in females than in males.

The most common types are those which result from disturbed septal formation. Of these, the interventricular septal defect, either alone or combined with other defects, outnumbered by far all other types of congenital heart diseases.

Congenital heart anomalies are found primarily in children. Of the 141 cases, 18 were stillbirths, and 83 died in the first five months of life. One hundred eleven (78.7 per cent) were born dead or died before the end of the first year of life. The types which live into the upper decades are, mainly, adult coarctation of the aorta, patent ductus arteriosus, atrial septal defect and mildly deformed cusps of the aortic valve.

The effects of the various types of anomalies on the heart in bringing about cardiac failure are briefly described.

REFERENCES

1. Abbott, Maude E.: Atlas of Congenital Cardiac Disease, The American Heart Association, New York, 18, 1936.
2. Jager, B. V., and Wollenman, O. J.: Anatomical Study of Closure of Ductus Arteriosus, Am. J. Path. 18:595, 1942.

NORTHWESTERN PEDIATRIC SOCIETY

The Northwestern Pediatric Society, representing the states of Minnesota, North Dakota, South Dakota and Montana, held a meeting at Minneapolis April 14. The JOURNAL-LANCET was made the official publication of the Society. Beginning with the issue of May 1945 the Pediatric Issue of the official publication will carry the papers read at the scientific meetings of the Society throughout the year. The names of officers for 1944 appear on page 169.

Patent Ductus Arteriosus

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WITH the introduction of more modern diagnostic methods in the study of cardiac diseases it is no longer sufficient to make a broad diagnosis of congenital heart disease. In the majority of instances, especially with the aid of the x-ray and electrocardiograph and more recently with the aid of angiocardiology, it is possible to diagnose the exact type of congenital lesion under consideration. The exact diagnosis is important, especially from the point of view of prognosis. This is particularly true in the case of simple uncomplicated patency of the ductus arteriosus now that this lesion can be cured by surgery.

Patent ductus arteriosus is one of the more common non-cyanotic congenital cardiac lesions. Strictly speaking it is not a congenital abnormality as the condition results from failure of the ductus to close immediately after birth. It is important to point out that two types of patency of the ductus occur. Failure of closure may accompany a developmental defect of the heart and the open ductus may be the only possible escape for the abnormal circulation. In such instances the flow of blood usually continues as in the fetal circulation; that is, blood flows from the pulmonary artery to the aorta, thereby resulting in cyanosis. Occasionally patency of the ductus occurs in developmental defects of the heart without cyanosis. In such cases it should not be difficult to diagnose the primary congenital defect. Patency of the ductus which accompanies developmental defects of the heart is not suitable for surgical treatment.

The other main type of patency of the ductus, the type with which we are concerned in this presentation, occurs as a simple failure of closure and is accompanied by no other cardiac abnormalities. For some reason, not yet definitely determined, the ductus fails to close as it normally should in the first few minutes of extra-uterine life. It is this type of case which lends itself to surgical ligation.

With some experience the diagnosis of simple patent ductus arteriosus is not difficult. These patients are not cyanotic; in most instances they are normally developed physically and have no other congenital stigmata so commonly found in congenital heart disease. In a small percentage of cases there is an accompanying stunting of growth resulting from the depletion of peripheral circulation due to the shunting of blood through the open ductus. Recent studies have shown that this shunt may total from 40 to 70 per cent of the entire circulating blood. Usually a thrill is palpable over the second and third left interspaces. The heart may or may not be enlarged, depending on the size of the ductus. Almost invariably, even though the total heart is not enlarged, there results enlargement of the pulmonary artery. Auscultation over the base of the heart will reveal the characteristic pathomonic continuous or so-called machinery

murmur. This murmur is heard best in the second and third left interspaces. The murmur is difficult to describe but is easily recognized after some experience. Frequently within the continuous murmur an accentuated second pulmonic sound is heard. The systolic phase of the murmur is transmitted throughout the anterior and posterior chest. In those cases in which there is considerable enlargement of the ductus not only is the pulmonary artery enlarged, but the branches of the pulmonary artery within the lungs are also enlarged and under the fluoroscope can be seen to pulsate. In such instances, a vascular type of murmur will also be heard especially throughout the posterior chest.

It is to be noted that the shunt in circulation is extracardiac and this results in a disturbance in blood pressure relationships. If the ductus is of considerable size the peripheral vascular findings will be similar to those found in aortic regurgitation; that is, there will be found a wide pulse pressure and the accompanying Corrigan pulse, capillary pulse, pistol-shock femorals, etc. In patients in whom the ductus is quite small the blood pressure findings may be within normal limits. Occasionally even in this type of case an increased pulse pressure may be detected after the patient is exercised. The extent of the pulse pressure is a fairly good indication of the magnitude of the shunt.

ELECTROCARDIOGRAPH FINDINGS

The electrocardiograph is almost invariably within normal limits. No marked axis deviation is found. There may be some slight slurring and occasional notching of the QRS, but by and large the electrocardiograph is within normal limits. Any marked abnormality in the electrocardiograph, especially a marked right or left axis deviation, should make one hesitate in concluding that simple patent ductus arteriosus is present.

ROENTGENOLOGICAL FINDINGS

X-ray studies are of considerable value not only in making the diagnosis of patent ductus arteriosus, but also in evaluating the advisability of surgery. Fluoroscopy is of especial importance because by this method one is able to determine the size of the pulmonary artery and is also able to determine whether or not the vessels in the lungs are enlarged and pulsating. The size of the pulmonary artery and its branches will correlate quite well with the magnitude of the shunt. X-ray films, if taken in various positions, will corroborate the fluoroscopic findings. Recently roentgenological studies with the aid of concentrated diodrast have been used in making differential diagnosis in congenital heart disease. Such studies make beautiful demonstrations and are highly interesting, but ordinarily unnecessary in the average case. It is well to point out that enlargement of the pulmonary artery occurs in many types of congenital lesions, but this finding alone is not sufficient to make a diagnosis of patent

†Clinical Director Children's Heart Hospital and Clinic.

ductus arteriosus. A number of such cases, where the only positive finding was a harsh systolic murmur over the base of the heart accompanied by x-ray evidence of enlargement of the pulmonary artery, have been referred to us erroneously as cases of patent ductus arteriosus to be treated surgically.

DIFFERENTIAL DIAGNOSIS

There are several cardiac conditions which may be confused with patent ductus arteriosus. One of the most important, especially in infants and young children, is the so-called venous hum. This is also a continuous murmur heard over the base of the heart. It is usually not as loud as the characteristic machinery murmur. The venous hum is generated in the vessels of the neck, may be heard over the base of the heart, and not infrequently is heard as far down as the apex. The murmur can be obliterated by moving the child's head from side to side or by applying pressure with the finger on the neck vessels. Of course none of the other findings of patent ductus arteriosus will be present.

Occasionally the diastolic murmur of aortic regurgitation will simulate the machinery murmur. In aortic regurgitation, however, there is invariably a pause between the systolic and diastolic murmurs. These murmurs are usually heard lower down along the left border of the sternum. The blood pressure findings may be exactly the same as in patent ductus arteriosus. X-ray studies, however, will reveal no enlargement of the pulmonary trunk or vessels in the lungs. The enlargement of the heart in aortic regurgitation will, of course, involve primarily the left ventricle producing a contour which is distinctly different from that found in patent ductus arteriosus. The electrocardiograph in well developed aortic regurgitation will reveal a marked left axis deviation.

Patients with interauricular septal defect commonly reveal x-ray changes of the heart which simulate the findings in patent ductus arteriosus. On fluoroscopy the contour of the heart may suggest that found in patent ductus arteriosus; however, in most instances the heart is considerably larger and more rounded in patients with interauricular septal defects. The pulmonary vessels are also usually much larger and pulsate much more in the septal defect. The leak in auricular septal defect is intracardiac in contrast to that in patent ductus. The peripheral vascular findings in interauricular septal defect are normal in contrast to the characteristic findings in patent ductus arteriosus. There should be no difficulty in making a differential diagnosis between these two lesions.

As has already been stated various other types of congenital heart lesions are commonly accompanied by enlargement of the pulmonary artery. Such localized increase in size of the pulmonary trunk in itself is not enough to make a diagnosis of a patent ductus.

The diagnostic criteria in patent ductus arteriosus may be summarized as follows:

1. History of heart disease from birth or early childhood.
2. No cyanosis or clubbing of the fingers.
3. Stunting of growth in a small percentage of cases.
4. Probable thrill over the pulmonic area.

5. Characteristic machinery murmur.
6. Increased pulse pressure.
7. Enlargement of pulmonary artery and branches.
8. Normal electrocardiograph.
9. Probable enlarged heart.

INDICATIONS FOR SURGERY

As has been shown in previous studies, the great majority of patients with patent ductus arteriosus develop some cardiac difficulty in early adulthood. About 40 per cent are known to develop subacute bacterial endarteritis in early adulthood. About an equal number die of congestive heart failure and a relatively small group die of rupture of the ductus or other complications. There is no doubt that an occasional patient lives out his normal expectancy. We have seen one such case in our experience and there are a number of others reported in the literature. It must be admitted, however, that it is quite rare to examine a patient with patent ductus arteriosus over the age of forty. For these reasons it is our opinion that where the diagnosis of uncomplicated patent ductus can be made, surgery should be seriously considered. This is particularly true in young people over the age of two. The diagnosis in infants under this age is usually difficult and hazardous. In such young individuals with a definite diagnosis if there is stunting of growth, increased pulse pressure, x-ray evidence of enlarged pulmonary artery, and enlarged pulmonary vessels, surgical ligation is indicated. On the other hand, in those instances where no evidence of cardiac strain can be made out one is justified in keeping such patients under observation and delaying surgery. It is agreed by all those surgeons who have had experience with this lesion that it is much easier to operate on the younger children. In adults calcareous deposits and thickening of the ductus commonly occurs and ligation in such instances is much more dangerous than in the young child with soft pliable vessels. In patients who develop subacute bacterial endarteritis, surgery should be carried out at once without attempting to sterilize the blood with chemotherapy. Before the introduction of surgery for this lesion there was a 100 per cent mortality in the infected cases. In the past several years 50 per cent of such infected patients have been cured by surgical ligation.

The operation for the cure of patent ductus arteriosus is a difficult one and requires a thorough knowledge of the anatomy and physiology of the heart and its vessels. The operation also requires the aid of a trained anesthetist. Surgical ligation should certainly not be attempted except by those surgeons in the larger clinics who have had experience with chest surgery.

In Minneapolis we have referred 19 patients with patent ductus arteriosus for surgical treatment. These patients have ranged in age from three to nineteen. The ligation has been successfully carried out in 16 instances. Two patients died of hemorrhage, either at the time of operation or soon afterward. One child, nine years of age, developed a blood stream infection about two months after operation, from which she subsequently died. In one instance, the first patient, a vessel was tied which was probably not the ductus. This boy is none

the worse for his surgery and will probably be operated on at a later date. The clinical results in the successful cases have been very satisfying and quite remarkable. These patients who in many instances have had considerable enlargement of the heart and were restricted in their activities have now been completely cured by surgery. We have under observation in our clinic 61 patients with patent ductus arteriosus and we propose to continue to refer these patients for surgery who show any evidence of cardiac difficulty.

Throughout the world there have by this time been several hundred patients operated for patent ductus arteriosus. The immediate mortality has been less than 10 per cent in the uninfected cases. As a result of the last few years of experience it is certain that fewer sur-

gical mishaps will occur. There have been a number of new innovations in surgical technic and it can be expected that the ultimate surgical mortality rate will be considerably below 10 per cent. A follow-up study of all cases operated throughout the world is needed at this time.

CONCLUSIONS

1. An exact diagnosis in congenital heart disease is now possible.
2. A preoperative diagnosis of uncomplicated patent ductus arteriosus can be made without error.
3. Those cases who show any evidence of cardiac strain should be treated surgically.
4. All patients with subacute bacterial endarteritis should be given the opportunity of surgery.

Preventing the Rheumatic Recrudescence*

A Consideration of the Several Modes of Prophylaxis Available to the Rheumatic Patient

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INASMUCH as no specific organism has been found to be directly responsible for the disease syndrome we recognize as acute rheumatic fever, it is not surprising that we have no specific toxoid or vaccine to prevent it. That a close connection exists, however, between rheumatic fever and the hemolytic streptococcus is generally accepted. More recently, the knowledge of this relationship has led to the development of certain therapeutic measures directed against the recurrence of subsequent rheumatic attacks in susceptible individuals. We know that recurrences constitute one of the most characteristic features of the disease, and, as Huse⁵ has pointed out, deaths in children occur from active rheumatic infection rather than from mechanical damage to the heart.

In the past, our efforts to prevent recrudescences have consisted largely of emphasizing certain very general hygienic fundamentals, because we know that the incidence of rheumatic fever and rheumatic heart disease is highest in persons of those lower economic strata wherein these basic principles are more often violated. Thus damp housing, crowded living, malnutrition, inadequate clothing and the like all predispose the rheumatic individual to further trouble. Hence we have advocated a well-balanced diet, high in vitamins B and C, a warm, sunny climate where protection from dampness and chilling is possible, and the avoidance of respiratory infections. We have insisted upon a prolonged convalescence, with bed rest for some time after all clinical and laboratory signs of rheumatic activity have disappeared.

To realize that such measures have been pathetically inadequate, we have only to know that rheumatic fever kills more children of school age than any other disease. In order to reinforce such a program, numerous investigators have adopted more specific methods with a con-

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siderable degree of success. These are: (1) immunological, and (2) chemotherapeutic.

Specific Immunization: Wasson and Brown,¹ reporting in the *Journal of Pediatrics* for July, 1943, describe their experiences with a hemolytic streptococcus toxin, work which had been suggested by the efforts of the United States Public Health Service over a number of years. Wasson and Brown used a tannic acid precipitated toxin of N. Y. strain No. 5 hemolytic streptococcus, administering this material to rheumatic individuals in the following manner:

The first year, doses of 5,000, 8,000, 10,000 and 12,000 skin test doses, contained in .1 cc. of the material, were given. The final dose of 12,000 STD was then to be repeated semi-annually. No generalized, and only mild local, reactions were observed. Their figures are as follows:

	Treated	Controls
1940-41 Total Season Cases	42	33
Recurrences	0	11 with 3 deaths
1941-42 Total Season Cases	31	27
Recurrences	2	6

This method would seem to be of some consequence. These investigators also observed that there was a definite decrease in subclinical rheumatic symptoms in the treated group.

PROPHYLACTIC CHEMOTHERAPY

1. *Sodium Salicylate.* The similarity of the manifestations of acute rheumatic fever to those of serum sickness both clinically and histologically was described by Von Pirquet. The success of salicylatization in preventing the development of serum sickness suggested to Coburn and Moore² that a like result might be obtained in rheumatic disease. They describe rheumatic fever as occurring in three phases: I—a streptococcal respiratory infection, II—an incubation period of 10 to 14 days, III—the at-

THE RELATION OF RHEUMATIC RECURRENTS TO SALICYLATE PROPHYLAXIS

	RHEUMATIC SUB- JECTS DEVELOPED RECURRENTS	RHEUMATIC SUB- JECTS ESCAPED RECURRENTS	TOTAL
Subjects received salicylates	1	46	47
Subjects received no salicylates	57	82	139
Total	58	128	186

After Tate's correction for continuity, chi square = 21.3
The value required for significance (P = 0.01) is 6.6

tack of rheumatism proper, lasting weeks or months. These workers have demonstrated that the serum complement diminishes during Phase III, and that circulating precipitins appear during Phase III.

They suggest the administration of 4 to 6 gm. daily of sodium salicylate (adult dose) during Phase I and for one month thereafter, as a method of avoiding the occurrence of Phase III. Salicylate given in this manner will prevent the formation of the precipitins mentioned above, but does not, however, modify the antistreptolysin response.

Prophylactic Sulfonamides. This method of preventing rheumatic recurrences is based on the assumption that by maintaining a certain level of sulfonamide in the blood stream, the incidence of streptococcal infections in the susceptible individual can be materially modified, and hence the occurrence of subsequent rheumatic flareups following these infections.

At first, rather larger daily doses of sulfa were employed than are now in general usage, a blood level of 2 to 3 mgm./percent now being considered adequate. A daily dose of 15 to 20 grains of sulfanilamide is usually sufficient to produce such a level in the average child. In the temperate zones the drug is given continuously during nine or ten months of the year, being abandoned only during the hot summer season. That such a program does prevent streptococcus infections has been shown by a carefully controlled study by Kuttner and Reyersbach,⁴ using 208 children in a convalescent cardiac home.

We have utilized prophylactic sulfonamide therapy in the Pediatric Cardiac Clinic of the University of Minnesota Hospital with results similar to those of other workers, over a period of from 1938 to 1943. The following table summarizes the figures obtained by some of the groups:

Our Minnesota study differs from that of Kuttner and Reyersbach previously mentioned in that most of our patients reside in surroundings far less happy than those of a cardiac hospital. These children, who come in from various areas of the state, are usually in poor economic circumstances. The factors of frequent exposure to infections under crowded home conditions, chilling, non-balance regarding respiratory infections, very ordinary diet, et cetera, are important, and for these reasons we feel our figures to be quite significant, believing that if recurrent infection can be prevented in this group, it can in any. It is perhaps of interest to note the number of deaths resulting from rheumatic fever and rheumatic heart disease in pediatric patients at University Hospital during the last three years, when the majority of rheumatic children have been receiving sulfonamide prophylaxis,

The Relationship of Prophylactic Sulfanilamide to Rheumatic Recurrences and the Occurrence of Streptococcal Pharyngitis in a Group of Children

#	Year	Control			Sulfanilamide			#
		Strep Pharyng.	Definita Rheum. Rec.	Dubious Rheum. Rec.	Pharyng. Rec.	Daf. Rec.	Dubious Rec.	
54	'40-'41	30	14	4	1	0	0	54
50	'41-'42	18	9	1	1	1	0	50
104		48	23	5	2	1	0	104

From Kuttner and Reyersbach., J.Clin.Invest. XXII:79, Jan '43

laxis, as compared with the years 1938 to 1940 when we were first testing the drug in but a few patients:

Year	1938	1939	1940	1941	1942	1943
Deaths from rheumatic fever	5	9	13	1	3	2

The actual number of rheumatics seen during 1941 to 1943 is markedly increased over those followed in 1938-1940.

As an example of how effective this type of prophylaxis may be, it may be helpful to review the case history of W. S. This patient was 10 years old when first admitted to University Hospital on April 28, 1939, because of an acute rheumatic episode characterized by joint pains, chest pain and fever, all of two weeks' duration. His history was remarkable in that his first rheumatic attack occurred in 1935, at six years of age; the second in 1936, and the third in 1937.

When seen by us in his fourth attack, he showed an erythema rheumaticum. Nodules appeared about six weeks after admission. He was discharged on June 25, 1939, somewhat improved but still on complete bed rest. In August he again developed joint pains, fever, fatigue, and precordial pain, but by October this spurt of activity subsided. He was then started on 2 gms. sulfanilamide daily and no further attacks occurred.

He has now received sulfanilamide during the seasons of 1939-40, 1940-41, 1941-42, 1942-43, and is again on



the drug this year. He has no evidence of rheumatic activity. In May, 1942, he had a mild attack of acute appendicitis which subsided without operation. Sulfanilamide was continued during this time. In July, he experienced a second attack and an acutely inflamed appendix was removed. His sulfanilamide was continued throughout this illness without recurrence of rheumatic activity, although his sedimentation rate rose to 120 mm. at the time of his acute appendicitis. Otherwise it has been normal throughout.

SUMMARY DATA CONCERNING RECRURENCES IN PATIENTS WITH INACTIVE RHEUMATIC FEVER OBSERVED BY VARIOUS GROUPS OF WORKERS: CONTROLS AND SULFANILAMIDE TREATED.

	Thomsen, Franco & Reichman		Coburn & Moore		Stowell & Sutton		Kuttner & Rysersohn		Chandler		Univ. of Minn. Hospitals	
	PASS	CONTROL	PASS	O.	PASS	O.	PASS	O.	PASS	O.	PASS	CONTROL
Total Season Cases	79	150	188	146	7	14	104	104	46	41	151	58
Recurrences	2	214	1	51	18	4	1	28	11	5	7	27*
Total Season Cases - All Observers.....555.....495												
Recurrences - All Observers.....19.....106												
Sulfa Treated Controls												
14 deaths, 2 from Subacute Bacterial Endocarditis, 1 from Rheumatic Fever and 1 from Pulmonary illness. #1 death, from hemolytic Staphylococcus Aureus and Type III Pneumococcus #1 death, from Acute Rheumatic Fever												

A careful analysis of our cases in whom recurrences developed in spite of sulfonamide therapy reveals that in most cases the drug was being taken irregularly, inadequately, or had been temporarily discontinued by the patient. Factors to be considered here include:

1. Failure to understand that medication should be continuous.
2. Indifference of patient or parents.
3. Transportation difficulties, such as gas rationing, which may prevent the patient from keeping clinic appointments to renew prescriptions, et cetera.
4. Stoppage of the drug by the local physician who is not familiar with the rationale of our treatment.

That irregular dosing fails to achieve the desired result is evidenced by W. D., whom we first saw on February 27, 1940, at the age of 12 years. At 7 years, he had suffered an attack of rheumatic polyarthritis, dyspnea, and orthopnea, which kept him in bed for six months and left him with mitral heart disease. After this, he enjoyed normal activity, but had several episodes of fleeting joint pains and fatigue. When admitted in February, 1940, he was suffering from a severe recrudescence. In addition to mitral disease, he had a transient bilateral pleural effusion and a probable pericardial effusion. Recovery was satisfactory.

Sulfanilamide was started in the fall of 1940 and given all season with no recurrent rheumatic activity. He also took sulfanilamide during 1941-42, and similar recommendations were made for the 1942-43 season. In the spring of 1943, the child developed definite signs of rheumatic activity and was hospitalized because of addi-

result which may occur when a diabetic fails to take his insulin.

Choice of Sulfonamide: For long continued administration of a sulfonamide drug, such as is necessary in the prophylaxis of rheumatic recurrences, sulfanilamide, we are convinced, is the drug of choice, at least insofar as children are concerned. It is our experience that children and adolescents tolerate this drug very well—possibly better than adults. We have had to discontinue it in very few instances.

Among factors to be considered in the choice of a drug is the expense to the patient. As has been mentioned earlier, our patients are of the indigent or low income group, and it is to our mutual interest to prescribe an inexpensive preparation. The cost of sulfanilamide is a fraction of that of some of the other compounds.

Sulfadiazine, now so popular in the treatment of acute infections, is not, in our opinion, the best for this purpose. Certain investigators report abnormal effects on the kidneys and urinary tract in as high as 30 per cent of patients given the drug. These vary from a few urinary crystals, to gross hematuria and even anuria resulting from ureteral blockage by the crystals. A drug with such potentialities seems hardly the one for prolonged usage. Sulfathiazole appears to have no advantage over sulfanilamide in the treatment of streptococcal infections which would justify its greater cost for routine use. We have not used sulfamerazine in our rheumatics as yet.

The use of any sulfa drug presupposes intelligent handling. We always check the blood count on the fourth day of administration, on the seventh and ninth days, and at weekly intervals for the first month, then relying on subsequent clinic visits for check. The local physician is usually most helpful in making these early blood counts.

Minimal signs of intolerance, such as rash, gastric distress and the like, usually do not necessitate withdrawal, but do mean that careful watching is essential. It may be necessary to reduce the size of the dose until it can be better tolerated. Even leucopenia may be but temporary, and may not occur subsequently if the drug is begun again in sufficiently small doses.

We are sometimes questioned by our colleagues in internal medicine regarding the prolonged use of any sulfonamide. They are particularly concerned about the possibility of sensitization phenomena which might hinder the subsequent administration of the drugs in the event of intercurrent infection such as pneumonia or meningitis. It is our considered judgment that such disease is far less likely to be responsible for the death of the rheumatic child than repeated attacks of carditis, which are statistically so much more probable.

L. E. is representative of the group of patients who require unusually careful management. Had we had sufficient patience and courage to experiment more fully with the various sulfonamides instead of abandoning our attempts at prophylaxis we might have prevented the tragic fatal septicemia.

This patient was first seen in January, 1939, with a history of rheumatic fever for three years, chiefly characterized by numerous episodes of polyarthritis. She was

THE RELATIONSHIP OF REGULARITY IN CONSUMING PROPHYLACTIC DOSE TO RHEUMATIC RECRURENCES

	NUMBER OF SEASONS ON DRUG									
	V		IV		III		II		I	
	REG.	IRREG. OF INC.	REG.	IRREG. OF INC.	REG.	IRREG. OF INC.	REG.	IRREG. OF INC.	REG.	IRREG. OF INC.
# of cases	1	-	5	-	5	3	11	5	26	7
Recurrences	0	-	0	-	0	2	0	4	0	1

University of Minnesota Hospitals Series

tional heart damage. At this time we learned that there were intervals of two to four weeks throughout the winter during which sulfanilamide was not taken at all. About three weeks prior to the onset of this attack, he suffered an upper respiratory infection at a time when he was not taking the drug.

This appears to be an example of the failure of protection when the drug is not taken regularly—the same

hospitalized in October, 1939, for an acute attack, during which she sustained mitral valve damage. Tonsillectomy was performed in August, 1940. In October, 1941, she was started on sulfadiazine, but this was discontinued in December because the patient could not afford the drug and because of mild gastrointestinal symptoms. Sulfathiazole was given from December, 1941, to February, 1942, but was discontinued because of leucopenia.

The patient did not return to Pediatric Clinic, but was admitted on the adult medical service in July, 1942, with a subacute bacterial endocarditis. She was given large doses of sulfadiazine, which caused *no* leucopenia, but which was later discontinued because of diminished urinary output and crystals in the urine. Her blood culture remained persistently positive and she showed no improvement.

She died at home in October, 1942.

SUMMARY

A method does exist which, although not free from danger and requiring close medical supervision, may reasonably be expected to prevent many rheumatic recur-

rences, and in turn materially affect the mortality and morbidity associated with this disease. This method consists of the prevention or attenuation of streptococcal infections by the continued maintenance of a low blood level of a sulfonamide.

Alternative methods of prophylaxis—namely, immunization against streptococci and the control of streptococcal infections with salicylates—are also available for patients who do not tolerate the sulfa drug for one or another reason.

It is possible that one of these methods, or a combination of both, may prove safer and as effective as sulfonamide therapy.

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Diphtheritic Myocarditis in which the Clinical Diphtheria Was Missed

Case Report

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THE patient, a five-year-old child, was admitted to the hospital on December 29, 1943, complaining of lethargy, intermittent epigastric pain, and anorexia for three weeks; pallor for two weeks; and edema of the face for three days.

This patient was perfectly well until she had a cold on December 1 from which she apparently recovered in four days. Diphtheria cultures were negative but on December 6 her sister was admitted to the hospital with clinical diphtheria. Repeat nose and throat cultures were negative for this patient. On December 10 she developed the "flu" which was characterized by running nose, anorexia and malaise. Just as she was recovering from the "flu" she had so-called "mumps" on the left side and although the swelling disappeared in two weeks her general condition remained poor. She gradually became more lethargic and anorexic and pallor became marked. She also complained of epigastric pain which was intermittent, without radiation or localization and of two to three minutes duration. No change in bowel habits had been noted during the last month and no nausea or vomiting had been present. Three days before admission puffiness of the face was noted. No urinary complaints except for albuminuria last September in a routine physical examination. A non-productive, brassy cough was present on admission and which the father stated although more

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Fig. 1.

frequent (20 to 30 times an hour) at the present time, had been noted for over a period of approximately one year and had been considered a habit. There was no history of red, swollen, tender joints and during the past

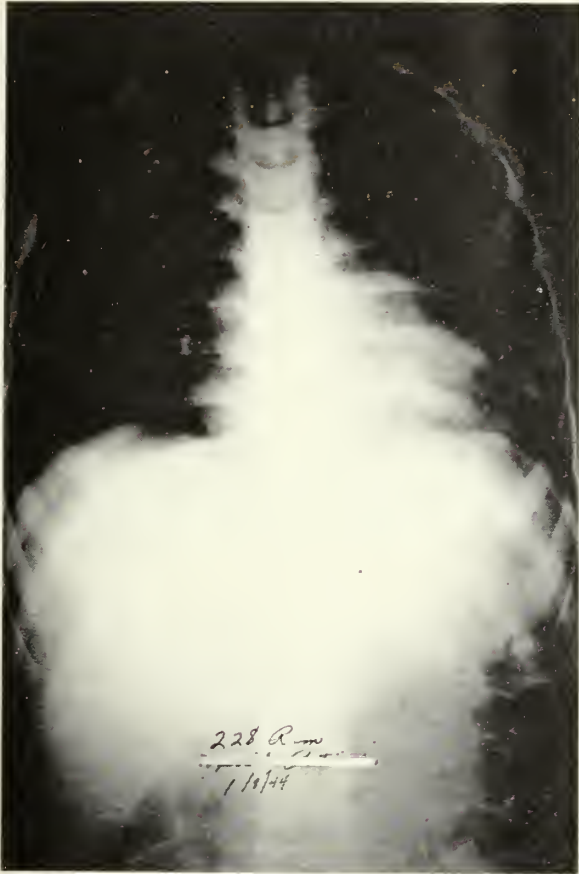


Fig. 2.



Fig. 3.

month there had been no chest pain, ankle edema, orthopnea or cyanosis. Previous routine physical examinations showed the heart to be normal. The patient had never been immunized.

Positive physical findings on admission were (1) a listless, pale and somewhat undernourished child of five years of age without dyspnea, orthopnea or cyanosis, with respirations of 20, pulse of 140 and blood pressure of 90/68; (2) 1-plus edema of face but no edema of hands, ankles or sacrum; (3) heart enlarged to percussion with the apex beat in the fifth interspace in anterior axillary line. Protodiastolic gallop rhythm was present but without murmurs. The lungs were clear to percussion and auscultation. (4) The liver was down 4 cm. and was moderately tender and without pulsation.

Laboratory data including hemoglobin, white and differential, urea nitrogen, vitamin C, sedimentation rate, venous pressure and plasma proteins were within normal limits. Urine analysis showed 1-plus albumen and very occasional hyaline and granular casts. Roentgenogram of the chest showed the heart enlarged in all diameters but the borders obscured by marked increase in bronchovascular markings in both lungs (Fig. 1). A large mass was present in the peritracheal region on the right side which was thought to be a gland. Electrocardiogram showed the PR interval to be .18, T_{1-2} isoelectric and the QRS complexes of low potential in all leads (Fig. 4). The Schick test was negative.

This case, at first, was considered a diagnostic problem although the indications that this was a diphtheritic myocarditis were good. Tuberculosis, interstitial pneumonia and a myocarditis following flu were considered. The Mantoux was negative as were gastric washings for tuberculosis. The temperature continued to remain below 100.8°F . and a bronchoscopic examination was negative.

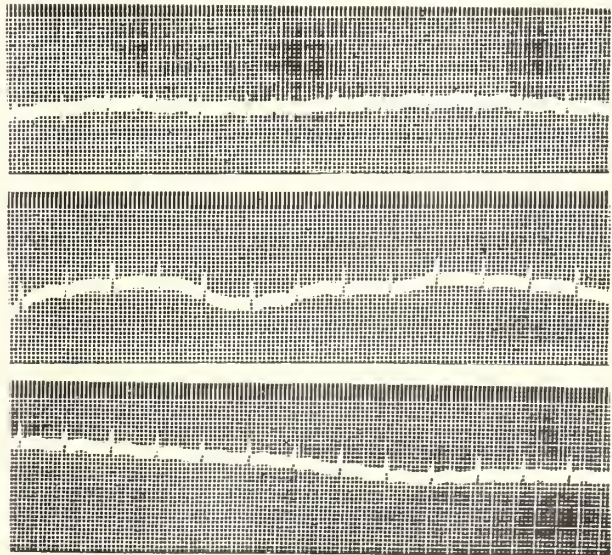


Fig. 4.

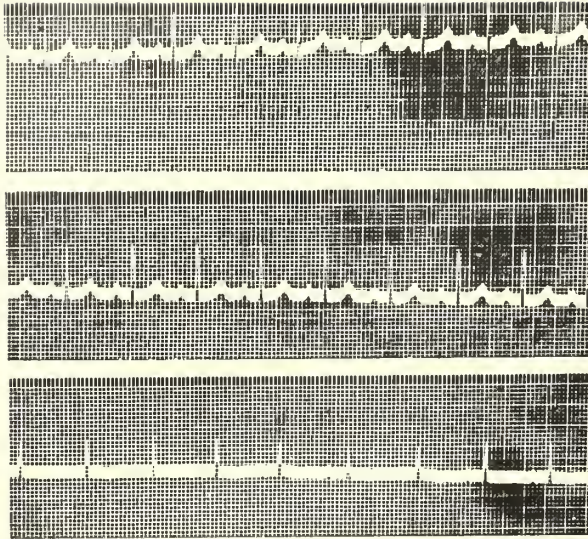


Fig. 5.

Her condition became worse and on January 2, 1944, fine moist rales were heard posteriorly in the bases of the lungs and the blood pressure was 55/30. She was digitalized with 6 cc. of cedilanid in divided doses and maintained on 1 cat-unit of digitalis leaf daily. Within twenty-four hours the rales were disappearing and the blood pressure had risen to 95/70 and within forty-eight hours enlargement of the liver had disappeared. On January 6, 1944, a nasal quality to the voice was noted and by January 13 she had difficulty swallowing liquids and food without regurgitation. On January 18 the extremities showed marked weakness, absent reflexes but no paralysis.

Improvement was gradual and she was discharged on January 9, apparently fully recovered.

DISCUSSION

The clinical diphtheria in this case was missed even though the child was seen by a physician at least three times during the acute illness and even though repeated cultures for diphtheria were taken. On admission to the hospital the diagnosis was not accepted without question until other complications of diphtheria were manifested, namely nasal voice, nasal regurgitation, severe weakness of the extremities with absent reflexes. Burkhardt and co-workers¹ found that many cases showing nerve involvement had an accompanying toxic myocarditis and usually the myocarditis appeared first. The negative diphtheria cultures even though reported from different laboratories should not have been relied upon to the extent that they were because it is known that occasionally cultures will be reported negative in a clinical diphtheria and the physician in this case must have suspected diphtheria because cultures were taken when she had her sore throat.

The diphtheria heart disorders³ fall into the three following groups: (1) lesions of the heart musculature; (2) abnormalities of rhythm; (3) interference with conductivity. The onset of myocarditis in this case is not known but on admission the electrocardiographic evidence of myocarditis included changes in the T wave, lengthened P-R interval, and low voltage in all leads. The QRS complexes gradually increased in height and one month after digitalis was discontinued the electrocardiogram was within normal limits (Figs. 5 and 6). It has been found that the protodiastolic gallop is the most common change of rhythm although any irregularity can take place. Death usually occurs from either (1) gross myocarditis, (2) acute complete heart block, or (3) ventricular tachycardia or fibrillation. Signs of grave prognostic importance are abdominal pain and vomiting

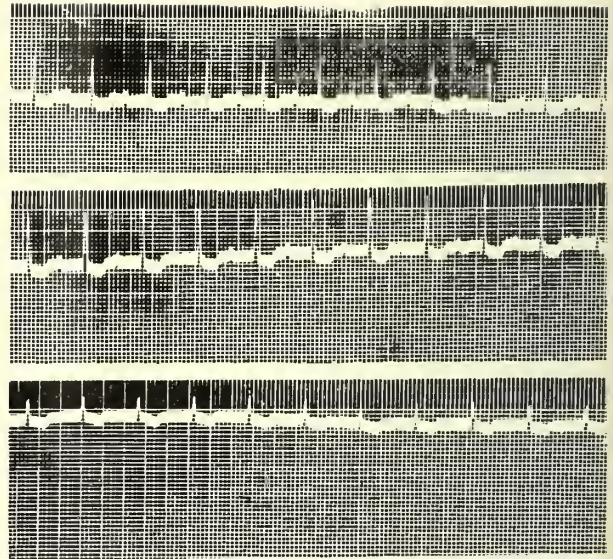


Fig. 6.

with falling pulse rate and blood pressure; albuminuria and an enlarged and tender liver, pronounced cervical adenitis, pallor, apprehension and restlessness.¹⁰ Many of these signs were present in this child and as she became worse with increasing evidence of decompensation digitalization seemed imperative.

The use of digitalis in diphtheritic myocarditis is questioned by many^{4,7,9,5} because of the nature of the pathological changes^{8,6} although some do say that it can be used with caution. Wesselhoef² states "that the functional disturbance here can be so similar to that observed in acute digitalis poisoning that one would hesitate to consider any dosage that would fulfill the term of 'digitalization' since further blocking is to be feared." Doses of digitalis, it is believed, must be small and therefore most clinicians advise against employing it at all although there is evidence that the drug is of benefit after the heart has been poisoned with diphtheria toxin.¹¹ Wesselhoef² does believe, however, if in the later weeks of convalescence signs of decompensation, as we had in this case, appear, digitalis should be tried cautiously. This patient responded remarkably to digitalis in doses that many would consider prohibitive. The progress made was followed by electrocardiograms and by x-ray examinations. The heart returned to normal size clinically and by roentgenogram (Figs. 2 and 3).

CONCLUSION

A case of diphtheritic myocarditis has been presented in which repeated cultures for the Klebs-Loeffler bacillus were negative. When cardiac decompensation became more marked she was digitalized with cedilanid and maintained on 1 cat-unit of digitalis leaf daily. The clinical response was very good and she was discharged from hospital apparently well, two months after admission to the hospital.

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New Interpretations of the Allergy Cutaneous Tests*

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ALTHOUGH many teachers of allergy have emphasized that a thorough history of the case and the trial elimination of foods from the diet and inhalants from the environment could lead to a solution of the allergic child's difficulties, most physicians still feel that skin testing is the shortest path to the discovery of the substance or substances causing the allergic diseases. This assumption is taken in spite of the fact that on the whole cutaneous tests have not given the clinician satisfactory results. However, the occasional case which is accurately diagnosed by skin testing maintains the interest in the procedure.

More research in the laboratory may bring new diagnostic aids in allergy but this work must await the end of the war and meanwhile the greatest advantage must be taken of the present methods. For the past twelve years all children who have been treated for an allergic disease at the University and Minneapolis General Hospitals have received the allergy cutaneous tests. Not only was this done to help determine the causative agent or agents but also to make clinical observations of the precautions which were necessary to obtain the best results.

First consideration was given to the material to be used for testing. After trying various types it was found that the liquid extracts of foods and inhalants (animal emanations, dusts, etc.) furnished in glass capillary tubes by a few manufacturers of biological products were most satisfactory. Care had to be taken to use extracts prepared in such dilutions that they did not produce positive reactions in nonallergic controls. The number of different allergens first chosen was around forty but this figure was gradually increased until a group of allergens was obtained which could be considered a complete set for the child. The pollens were added in the powdered form. Bacterial allergens and extracts of fungi and molds were not considered important enough for routine testing. The distribution of the allergens is shown in Table 1. The foods were listed first not alphabetically but in groups, the constituents of which are related especially from the allergist's viewpoint. The inhalants followed the foods, and the pollens were last. They were made up into sixteen groups representing approximately fifty-four different pollens and the groups are listed in the order of the pollinating dates.

Next, the method of application was checked. Since children were being studied, intracutaneous testing was not long employed chiefly because the quantity of material introduced into the skin varied too much. The child would struggle just enough to make it practically impossible to place the allergenic extracts at the same depth in the skin for each test and to measure accurately the amount injected. The so-called scratch technic was found to be easier to perform. With this method the skin of the back was gently cleaned with the ether-alcohol mixture or acetone. No vigorous rubbing of the

epidermis was permitted. Scratches, one-eighth to one-fourth of an inch in length, were made with any sharp instrument. The extracts were carefully rubbed into the scarifications. Later this procedure was reversed in that the fluid was applied first and a scratch was made through each droplet. The children did struggle and a uniformity in the scarification was not obtained. Some were superficial, some were deep. This led to a lack of consistency in the allergic reactions.

The pressure-puncture technic was substituted. With this procedure an ordinary steel needle was employed to break the epidermis. It was held almost horizontal to the surface of the skin and the point was pressed down several times. At first this method was considered to be fairly satisfactory but later it was observed that the epidermis was not broken uniformly. For some tests the allergen was properly introduced, but for others the pressure exerted was too light to cause much abrasion and subsequent introduction of the allergen.

The puncture technic was finally tried. A drop of each allergen was placed on the skin and then several direct punctures of the epidermis were made through the droplets being careful to keep all punctures close together and to avoid going too deep in order to prevent bleeding. The method gave good results. Although originally four to eight punctures were employed the number was soon reduced to a range from one to four. It was discovered that a preliminary examination of the child's skin gave the best clue as to the number of punctures to be used. In some cases the epidermis was apparently easily disturbed and one puncture was sufficient, in other instances four punctures were necessary to elicit the best results. However, the majority of the children gave consistently the same positive reactions upon repetition of the tests when two punctures were employed. Clinical studies now in progress may modify this in that the most accurate sensitivities of the patient appear to be revealed by the reactions obtained when three punctures are used for foods, two for inhalants, and one for pollens. Since the punctures were made close together and no blood was drawn, the tests were considered to be more uniform than those performed by any other method. This was reflected in the results as shown in Table 2. The value of the positive reactions in determining the cause or causes of allergic diseases was greatest with the puncture method of cutaneous testing.

In spite of the efforts to make the allergy tests as reliable as possible, multiple reactions which were not all of clinical significance occurred frequently. The age of the patient was the determinant as to the best procedure to follow. In infancy and early childhood, the food allergens were extremely important and in the latter part of the preschool period the foods and inhalants became equally important. There was thereafter an increasing sensitivity to all of the inhalants during the school years. The pollens became very important at puberty.

*From the Department of Pediatrics, University of Minnesota Medical School.

TABLE 1
Allergens for Cutaneous Testing in Children

1. Control	40. Beet	Inhalants, etc.
Ingestants	41. Spinach	1. Cat
2. Beef	42. Buckwheat	2. Cow
3. Lamb	43. Rhubarb	3. Dog
4. Pork	44. Sweet potato	4. Horse
5. Egg white	45. Figs	5. Sheep (wool)
6. Milk	46. English walnut	6. Goat
7. Codfish	47. Hazelnut (filbert)	7. Hog
8. Halibut	48. Cashew	8. Rabbit
9. Herring	49. Brazil nut	9. Orris root
10. Salmon	50. Apple	10. Feathers (mixed)
11. Chicken	51. Pear	11. Cotton seed
12. Barley	52. Almond	12. Kapok seed
13. Corn	53. Apricot	13. Flax (linseed)
14. Oat	54. Cherry	14. House dust
15. Rice	55. Peach	15. Glue (fish)
16. Rye	56. Plum	16. Pyrethrum
17. Wheat	57. Prune	17. Lycopodium or hemp
18. Carrot	58. Blackberry	18. Tobacco
19. Celery	59. Red raspberry	
20. Peppers	60. Strawberry	
21. Potato	61. Blueberry	
22. Tomato	62. Cranberry	
23. Kidney bean	63. Currants	
24. Lima bean	64. Grapefruit	
25. Navy bean	65. Lemon	
26. String bean	66. Orange	
27. Pea	67. Grape	
28. Peanut	68. Raisin	
29. Soybean	69. Banana	
30. Cucumber	70. Olive	
31. Pumpkin	71. Pineapple	
32. Squash	72. Cocoanut	
33. Asparagus	73. Chocolate	
34. Garlic	74. Coffee	
35. Onion	75. Tea	
36. Cabbage	76. Cinnamon	
37. Cauliflower	77. Cloves	
38. Turnip	78. Ginger	
39. Lettuce	79. Mustard	
	80. Tapioca	

Furthermore, in connection with the foods, it was necessary to consider the disease before any of the positive reactors were removed from the diet. Dairy products such as milk, cheese, and eggs were usually of greater significance in eczema than other positive reacting allergens such as cereal, fish, vegetable or fruit. The asthmatic child required first consideration of meat, fish or nuts even though other food allergens gave positive reactions. In allergic rhinitis cereals, dairy foods and chocolate were most important. Urticaria gave the poorest response to cutaneous testing but if the fruit, vegetable or nut allergenic extracts gave positive reactions, then those results were usually of definite clinical value. Table 3 illustrates roughly the relative significance of the positive reacting food allergens in the different allergic diseases.

The foods presented another problem. Often within the groups listed in Table 1, there were many positive tests of various intensities, the strong reactors being less important than the weak ones. Rice and rye were apt to yield larger reactions than wheat. However, wheat had to be completely eliminated from the diet for the best results while the child could eat a little rice or rye without any increase in symptoms. Peppers often reacted more strongly than tomato, although the latter was more important. Cucumber frequently produced a weak

TABLE 2

The Clinical Value of the Results of Cutaneous Testing in Children by Various Methods
(All ages and Allergic diseases are represented)

	Scratch		Pressure-Puncture		Puncture	
	Cases	Pct.	Cases	Pct.	Cases	Pct.
Good	30	19	91	30	99	41
Fair	44	28	97	32	91	36
Poor	83	53	115	38	58	23
Total No.	157	100	303	100	248	100

TABLE 3

Clinical Value of Positive Reacting Food Allergens

	Infantile Eczema	Chronic Eczema	Asthma Infant	Asthma Child	Allergic Rhinitis	Chronic Urticaria
Meat			+			
Dairy Prod.	++	++	+—	+—	+	
Cereal	+			+—	++	
Fish	+—		+—	+		+—
Vegetable		+		+—		++
Fruit	+— (juice)	+				+++
Nuts				+	+—	+
Chocolate					+	+—
Spices and Flavors					+—	+—

action while squash yielded a markedly positive test. Nevertheless, the cucumbers if eliminated from the patient's diet gave the most satisfactory clinical response. Apricot and peach were more significant than any other allergens in their group. Oranges tended to produce a weaker reaction than grapefruit but still were very important and often required complete elimination from the infant and young child's diet. Grape and raisin frequently gave large cutaneous reactions in spite of the fact the weaker reacting pineapple of the same group was of greater value for the elimination diet.

Inhalants caused less trouble, although reactions to goat, wool, flax, and tobacco did not always indicate the true state of the sensitivities of the children. However, contrary to other writers, the studies revealed that positive tests from animal emanations, feathers (mixed) and cottonseed (linters felt) were of definite value regardless of the size of the reaction.

Occasionally an interesting phenomenon took place. One area of the child's back would flare up and develop the majority of the positive reactions while the remaining regions showed only a few scattered positive tests. No explanation could be given for this except that a neurological examination of the skin in this area revealed an increased sensitivity to touch. Some of these cases gave a positive history of urticaria. Dermographia was considered but was not always present.

When grouping of the positive reactions did occur, the tests were repeated using the reverse order to make sure of the area of hypersensitivity, after which this region was avoided. The accompanying figure reveals the pattern of positive reactions in a localized area. Although the upper portion of the back is shown as the sensitive region, any area could reveal this phenomenon of localized irritation.

No attempt has been made to point out all the precautions associated with the cutaneous testing of the allergic child. Only practical points in addition to those of a previous communication are briefly discussed in hopes that this diagnostic procedure can remain a valuable part of the allergic work-up until future investigations produce a satisfactory substitute.

SUMMARY

1. Children with allergic diseases were tested with a complete set of well prepared allergens consisting of ingestants, inhalants and pollens arranged in proper order. The back of the patient was found to be the best location for this procedure.

2. The puncture technic was observed to give most satisfactory results.

3. Multiple reactions occurred among the various foods, inhalants and pollens. In such cases the positive food reactions were of greatest value in the infant, the inhalants later in the preschool period and the pollens up to and through puberty.

4. Food allergens presented at least two problems. Some were found to be more important in one allergic disease than in the others. Within a given group of related foods, the strong reactors were often observed to be less important than the weak ones in preparing an elimination diet for the child.

5. Inhalant reactions were more likely to indicate the true state of sensitivity of the allergic children.

6. Any localized area of hypersensitivity or hyperirritability of the skin disturbed the true pattern of cutaneous reactions to the allergenic extracts. This phenomenon occurred often enough to make it worth while to report.

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Growth and Development of Premature Quadruplets

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THE care of premature quadruplets is indeed an experience, an experience that rarely falls to the lot of a physician during a lifetime of practice. Although quadruplets occur about once in every 650,000 births, parturition usually happens so early in the period of gestation that the infants have little or no chance of survival.

At the present time there are seven living sets of quadruplets in the United States, and it is the purpose of this paper to report on the growth and development of one of these sets. In this particular case it is of interest to point out that the existence of a quadruple pregnancy was diagnosed prior to delivery. Hence, may I preface my remarks on the Brown Quadruplets with the reminder that the successful termination of this delivery was largely due to the early diagnosis and prenatal prophylaxis instituted by their obstetrician, J. F. Hanna.

PRENATAL CARE AND DELIVERY

Mrs. Nick Brown, age 37, of Leonard, North Dakota, presented herself for examination at about the sixth month of her gestation period, according to her menstrual calendar. Her measurements being somewhat excessive for that period, a radiograph was taken which clearly revealed four heads, as can be seen in Figs. 1. Inasmuch as the excessive size of the uterus, together with the increased weight of its contents, must play some part in precipitating an early labor, measures were taken to avoid such an occurrence by keeping the mother off her feet. She was hospitalized at six months of pregnancy, and immediate attention was paid to her diet in



Fig. 1a.



Fig. 1b.

regard to vitamin, mineral and protein intake. Prior to delivery the mother received vitamin K. The labor itself was spontaneous and the delivery quick and uneventful, the mother receiving a minimum of analgesia. The girl arrived first at 1:10 P. M., February 6, 1941, in an amniotic sac separate from the three boys—the latter, therefore, being considered identical triplets. Chances of accident or asphyxia were obviated by inversion—the total time of delivery of the four babies requiring less than five minutes.

POSTNATAL CARE

Respiration and Temperature Stabilization. The babies all breathed spontaneously at birth and no resuscitation measures were necessary. The color in each instance was very good. As soon as the cord was cared for, each infant was placed in a pre-heated incubator, and the incubator wheeled into a room over which the "No Admittance" order was rigidly enforced. No one gained admittance to this room except those upon whose shoulders the care of the children rested, and even these individuals were checked for respiratory and other infections.

The incubators used were those developed at the University of Minnesota and the Minneapolis General Hospital, in which the temperature and humidity are automatically controlled.¹

Once in the incubators the babies were handled as little as possible. Their temperatures were taken regularly, inasmuch as the premature's temperature-stabilizing mechanism is notably poor. Baths and even oil rubs were sus-

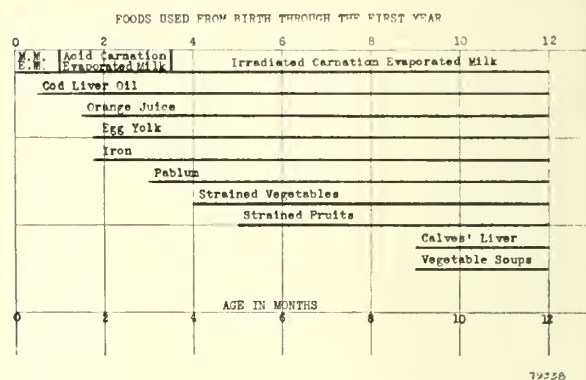


Fig. 2.

ended for five to seven days. Excreta pads were used, since they lessened the manipulation of the child. Cyanotic spells, which are so common in the premature during the early days, gave us little trouble. A tank containing carbon dioxide and oxygen was kept constantly at hand for such an emergency. The babies were kept in the incubators for one month.

Feeding Regime. The babies were fed according to the Stoesser regime,² and for the first few days this was accomplished without removing them from their incubators. They were fortunately able to take fluid by the nipple, and at no time was gavage necessary. Lactate Ringer's solution was used by hypodermoclysis at irregular periods whenever the total fluid intake was deficient or whenever it was felt that more food would be taken if water were not given by mouth. Every effort was made to obtain sufficient mother's milk. By the end of the first week, however, small amounts of complement had to be introduced, and irradiated Carnation evaporated milk, acidified with lactic acid, was used. By the end of the first month the breast milk had been completely supplanted by the evaporated milk.

Feeding at no time presented any unusual difficulties. Most concern was naturally felt for Clayton, the smallest of the group. He was fed with a dropper at first, but quickly manifested his ability to use a nipple, and by the end of the first week his twenty-four-hour fluid intake amounted to around 500 cc. The quadruplets have always had excellent appetites and have taken ample amounts of whatever was offered. No attention was paid to their caloric intake, and I heartily agree with Stoesser's statement: "The idea that so many calories per pound or per kilogram should be given has been over-emphasized. A good plan is to feed the premature baby an amount sufficient for adequate and consistent gain in weight."²

By the time they weighed around 8 pounds they were on a four-hour schedule, being fed at 6:00, 10:00, 2:00 and 6:00. At these hours they were awakened if necessary. They were then fed once between 6:00 P. M. and 6:00 A. M., at whatever hour they awakened. This had the tendency to encourage the babies to sleep through the night feeding entirely, and before they were three months of age all of them were getting four feedings per 24 hours with no feeding during the twelve hours from 6:00 P. M. to 6:00 A. M. Babies encouraged to adopt

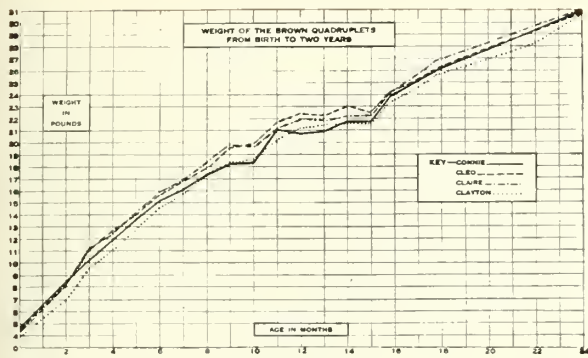


Fig. 3.

such a regime have much better appetites and develop a greater capacity for food at the individual feeding hour. By the third month Clayton, the smallest of the group, was averaging between 800 and 900 cc. of evaporated milk formula per twenty-four hours.

Gastric upsets have been conspicuous by their absence. A food table is supplied (Fig. 2), indicating the time at which various articles of diet were added.

WEIGHT AND LINEAR DEVELOPMENT

For the first two weeks the babies were removed for weighing every third day and for the succeeding four weeks every second day, following which time daily weights were taken. They presented a combined weight of 17 lbs. 9 oz. at birth. Their weight progress can be illustrated in tabular form.

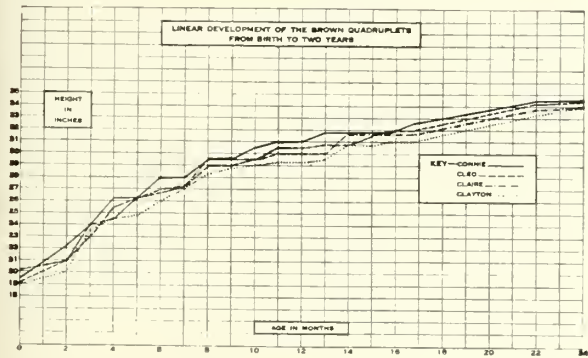


Fig. 4.

These weights illustrate the usual fact that the premature's initial loss is less than that of the infant of average weight. The quadruplets regained their birth weight within an average period and made a comparatively more rapid gain in the early months, placing them on a par with babies of normal weight at the end of the first twelve months. Both weights and heights over the two-year period are illustrated graphically in Figures 3 and 4. The development of these quadruplets for the period reported is equivalent to that of normal-term male infants fed on irradiated evaporated milk.³

MEASUREMENTS OF ADEQUACY OF NUTRITION

The growth and height of the Brown Quadruplets is in the high normal range, according to the Kornfeld standards.

Bony Development. Daily ultraviolet-ray exposures were started at two months of age, using a General Electric large portable unit. As a result of these treatments, plus the vitamin D from the irradiated evaporated milk and codliver oil, none of the infants has shown the faintest sign of rickets, clinically or radiologically (Fig. 5).

X-ray studies of the chest and body, including the hips, were made at four months. Some widening of the upper mediastinal shadows was noted in Connie, Cleo and Clayton. In the first two it was felt to be due to vascular shadows. In Clayton, however, it was felt sufficiently indicative of thymic enlargement that x-ray treatments were administered in his case. Later radiographs showed disappearance of the shadow. The lung shadows in all were normal. Connie presented the most advanced bony development. In addition to a well-developed epiphyseal center for the medial aspect of the head of each humerus, she also showed the epiphyseal nucleus for the coracoid process of each scapula, which was not visualized in the remaining quadruplets. Clayton, the smallest of the group, manifested the least advancement in bony development. Congenital hips were ruled out.

Freedom from Infections. Infections were uppermost in our minds during the early days. Pressure was indeed great from news and movie photographers, as well as the curious public. Strict enforcement of isolation rules and technic by the hospital authorities and the complete co-operation of all reduced the problem of outside contacts to a minimum. At about 2½ months of age all developed a stomatitis, manifested by redness of the tongue and the appearance of little white blisters thereon. This was accompanied by a leucocytosis and lasted over a period of about two weeks. At this time lactic acid was removed from the diet and 50 mgs. of ascorbic acid were given daily. This represents the only infection of any kind manifested during their first two-year period.

Blood Cytology was started at about six weeks, at which time the usual physiological anemia was already apparent. Iron was immediately added to the diet. Blood counts which have been taken at approximately monthly intervals are tabulated for the first year (Table, Fig. 6).

Dentition. The outstanding feature of their teeth is the similarity as to form, shape of arch, and occlusion, which are almost identical. This is shown in the four pictures reproduced in Fig. 7. There is a slight difference in the eruption period of Clayton, as his lower second deciduous molars are just erupting, while the others are fully erupted.

The teeth show very good structure, with hard flint-like enamel, fissures and pits well closed, and no tendency to caries or any indication of chalky structure in the enamel. There are no stains or deposits. The gums and surrounding tissues are pink and firm, giving a clean, healthy mouth appearance. The occlusion is good, with a slight tendency toward protrusion and heavier development of the alveolus on the upper anteriors. This is probably congenital, as the father's arch is similar. The teeth, including the posterior, are spaced, as shown in the pictures, indicating good development and expansion of the arches. The spacing may develop in the permanent set to some extent, as the father's teeth are apart, with a rather wide arch. The structure and health of the



Fig. 7.



Fig. 7.

	Birth Weight	Initial Loss	Regained Birth Weight	6 Months	12 Months	24 Months
Connie.....	4 lbs. 10 oz.	90 gm.	10th day	15 lbs. 2 oz.	20 lbs. 12 oz.	31 lbs. 3 oz.
Cleo.....	4 lbs. 10 oz.	140 gm.	15th day	15 lbs. 11 oz.	22 lbs. 7 oz.	30 lbs. 14 oz.
Claire.....	4 lbs. 9 oz.	60 gm.	9th day	15 lbs. 13 oz.	22 lbs.	31 lbs. 5 oz.
Clayton.....	3 lbs. 12 oz.	40 gm.	9th day	14 lbs. 9 oz.	21 lbs. 3½ oz.	30 lbs. 11 oz.

TABLE, Fig. 6

Date	CONNIE			CLEO			CLAIR			CLAYTON		
	Hb (Gms.)	RBC	WBC	Hb (Gms.)	RBC	WBC	Hb (Gms.)	RBC	WBC	Hb (Gms.)	RBC	WBC
3-31-41	9.0	3.01		10.5	3.62		10.0	3.31		10.0	3.46	
4-25-41	9.5	3.01	7,500	10.5	3.38	11,700	11.0	3.20	11,550	10.5	3.46	10,900
6- 2-41	11.8	3.67	9,550	12.0	4.22	9,700	12.3	3.70	8,950	10.0	3.19	8,600
7-16-41	9.5	3.96		11.0	4.08		11.0	3.64		11.0	3.60	
8-12-41	12.5	4.52	10,450	13.5	4.52	9,600	13.0	4.00	12,250	13.8	4.45	12,350
9- 3-41	12.9	4.15	13,100	13.0	4.04	11,700	12.5	4.01	11,800	13.0	4.27	10,100
10- 3-41	12.5	4.06	10,300	12.7	4.06	10,700	12.3	3.97	11,200	12.7	4.09	10,000
11-13-41	12.2	3.98	11,100	12.7	4.17	9,000	12.7	3.98	10,600	12.5	3.97	11,800
11-22-41	13.3	4.02	9,800	12.7	4.06	9,600	12.4	3.99	10,400	13.0	4.21	9,800
12-13-41	13.0	4.30	12,600	12.5	4.01	10,400	12.0	4.07	9,500	12.2	4.02	9,000
1- 9-42	12.7	4.08	9,800	12.5	3.92	10,700	12.2	3.99	15,000	12.3	4.08	12,300
2-19-42	12.0	4.15	15,200	12.0	4.03	17,400	12.5		18,500	12.5		22,000
2-23-42	12.2		15,800	11.5		11,600	11.8		12,400	11.0		10,400

mouth tissues are exceptionally good in all four of the children.

GENETICS

Connie is readily separated from her three brothers in her general facial appearance. She has a longer, narrower face. The three boys are so alike in their facial characteristics that even the mother becomes confused in

differentiating one from the other. The children, however, have not the least difficulty, and to the question—"Where is Clayton?"—the other three immediately and in unison point him out.

Hair and Skin. Connie has absolutely straight hair and a more deeply pigmented skin than the boys. Her hair is likewise darker. All the boys have slightly curly hair of the same light shade and texture.

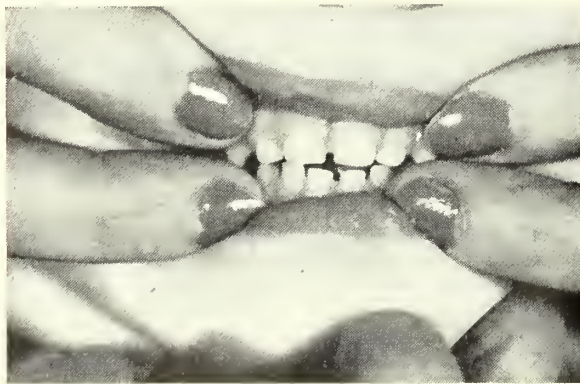


Fig. 7.

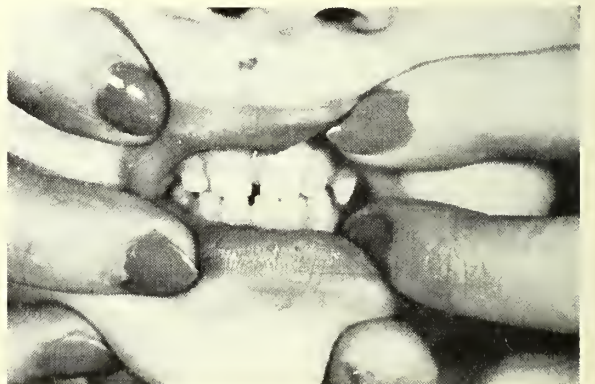


Fig. 7.



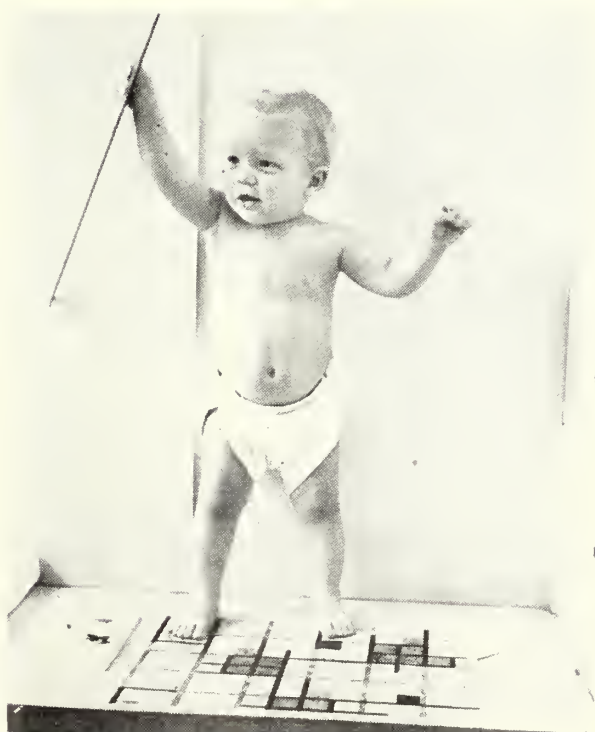
CLEO (Fig. 5)



CONNIE (Fig. 5)



CLAYTON (Fig. 5)



CLAIR (Fig. 5)

Blood Grouping shows an interesting although usual phenomenon, Connie being in Group B and the three boys all in Group O. The mother is in Group O, the father in Group B.

IMMUNIZATION

At seven months they were vaccinated for smallpox and inoculated for diphtheria. Following this, pertussis vaccine was administered. In March, 1942, Schick tests and intracutaneous Mantoux tests were negative in all. All other members of the family, together with the mother and the father, were included in this program. All not vaccinated within a period of five years were vaccinated or revaccinated, and diphtheria toxoid was used on all who manifested a positive Schick test. Those not having had whooping cough received the vaccine.

RECAPITULATION

The growth and development of the Brown quadruplets during their first two years of life is described. This quadruple pregnancy was diagnosed prior

to birth and proper measures to assure adequacy of the mother's diet and continuation of pregnancy were instituted. Brief reference is made to the delivery, immediate postnatal care, and feeding. Charts of the babies' weight and linear development, nutrition, and blood cytology are presented, together with pictures of their over-all development and dentition.

CONCLUSION

The general health and development of the Brown Quadruplets appear to be normal, and there is no evidence of any physical or mental abnormality resulting from their prematurity.

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Duodenal Obstruction in the Newborn*

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ALTHOUGH duodenal obstruction is a rare congenital anomaly, occurring only about once in 20,000 infants, the surgical alleviation of this condition has made such progress in the past fifteen years that I feel the abnormality should be reviewed and again called to our attention. My most valid reason for this presentation is the fact that recently I had the privilege of observing, operating, and curing three infants who presented this anomaly.

Duodenal obstruction presents an emergency in the first few days of life which always requires surgical intervention. Bland-Sutton in 1889 stated that these anomalies occur at the site of complex embryological events. Ernst in 1916 performed the first successful operation for duodenal obstruction in the newborn.

The obstruction may be intrinsic or extrinsic in nature. If the condition is intrinsic it may be either an atresia or a stenosis. Any portion of the duodenum may be affected, but the first and third portions are most frequently involved. According to Ladd, stenosis is more frequent in the duodenum than atresia.

The extrinsic type of obstruction may be caused by congenital peritoneal bands, blood vessels crossing the third portion of the duodenum, malrotation of the large gut, or abnormal fixation of the cecum. These etiological factors may also occur in combination.

The intrinsic obstruction presents an interruption in the continuity of the bowel which may be a gap, a cord-like structure, or a septum.

Tandler, an anatomist, advanced the most reasonable theory regarding the etiology of intrinsic obstructions.

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He examined eleven fetuses aged 20 to 60 days and found that on the 30th day an epithelial proliferation begins in the duodenum and results in a more or less complete obstruction of the lumen. The obstruction is greatest on about the 45th day, and seems to have ceased about the 60th day. Tandler's theory is that congenital atresia of the small intestine is due to persistent physiological epithelial obstruction.

This work was confirmed by Kreuter and Forssner. Forssner maintains that a narrow epithelial stenosis may become a complete atresia later on in fetal life, and in this way he explains the presence of meconium below the atresia.

Thus it is clear that if recanalization fails at any stage short of completion, an intrinsic obstruction results. If the obstruction is complete, it is an atresia, if incomplete, a stenosis.

Fortunately, this obstruction is usually single, only multiple in about 15 per cent of the cases.

The outstanding symptom in infants afflicted with this condition is vomiting. The onset of vomiting occurs with the first feedings and is continuous. If the obstruction is located above the ampulla of Vater, the vomitus does not contain bile, if below it always does. If an atresia is present, they vomit the entire feeding, if a stenosis, some small portion of the feeding may pass the stenotic area. The infant rapidly becomes dehydrated, loses weight sharply, and may or may not pass meconium. Anuria is present, the fontanel becomes depressed, the tissues present poor turgor, and the baby is usually running a dehydration temperature. If the obstruction is complete, normal colored stool is never passed and cornified epithelial

cells are not found in the meconium. If incomplete, very small but colored stools appear and cornified epithelium is present.

Distention usually appears in the upper abdomen because of the dilated stomach and duodenum, while the lower abdomen remains flat.

Gastric peristalsis, in most instances, is visible, and occasionally peristaltic waves can be seen transversing the duodenum.

When these symptoms are present in a newborn, a flat plate must be taken of the abdomen at once. If no gas is visualized in the small bowel, you are dealing with an atresia. On the other hand, if small amounts of gas are scattered throughout the small and large bowel, the infant has a partial obstruction which may be either intrinsic or extrinsic. The stomach will present moderate to marked dilatation, you are usually able to visualize the distended, gas filled, duodenum. The duodenum in our four-day-old infant was about 3 cm. in diameter, and was at first thought to be the pyloric end of the stomach.

Frequently, the exact location of the obstruction can be determined from the flat plate alone. However, if there is any doubt, and the obstruction is incomplete, a very thin barium mixture may be given by a stomach tube under fluoroscopic control, and flat plates will then reveal the exact location of the obstruction. Occasionally, a plate taken with the baby in the up-side-down position will be helpful.

Differential diagnosis in this condition is not particularly difficult. However, the following conditions must be kept in mind:

In an esophageal stricture, the vomiting occurs immediately after feeding is given.

When a tracheo-esophageal fistula is present, cyanosis and cough are produced while giving fluids.

Pylorospasm presents no bile in the vomitus, stomach is not distended, gas is present in small bowel, and the condition responds to medication.

Pyloric stenosis has projectile vomiting about the second or third week of life, bile is absent from vomitus, gas is present in small bowel, and in most instances a pyloric tumor is palpable.

Routine digital examination will rule out an imperforate anus.

When a partial duodenal obstruction is the preoperative diagnosis, it is impossible to tell whether it is intrinsic or extrinsic in nature. Only an exploration will determine the true pathology.

Occasionally, a peritoneal band will cross the third portion of the duodenum and a malrotation of the large bowel will accompany it. This condition may lead to severe intermittent vomiting attacks which are produced by a volvulus. One of our cases is in this category.

If the cecum is anchored in the upper right quadrant, as the results of malrotation, it will produce an extrinsic type of duodenal obstruction. This is the anomaly so admirably described by Ladd, and the operation rightfully bears his name.

The diagnosis having been established, you must at once proceed with surgical interference. If the condition is one of atresia, you are aware before starting that some short-circuiting type of operation will be necessary. If

stenosis is present, you cannot foresee what your exact operative procedure will be.

The pediatricist, who must be your right-hand-man in this type of work, will help guide the preoperative preparation. These infants need repeated hypoclysis, and usually a transfusion before operation. Before proceeding, wash the stomach until the return is clear, wrap the extremities in flannel or cotton-batting, and place the baby on a heated platform on the operating table. Remember that these babies do not tolerate heat loss. The anesthetic of choice should be ether by the open-mask drop method, and given only by one skilled in infant anesthesia.

A right para-median incision extending from the costal margin to below the umbilicus will provide excellent exposure. Be very careful about bleeding points, infants do not tolerate blood loss. Upon opening the peritoneal cavity, determine at once the presence or absence of malrotation. Lift the entire small bowel from the peritoneal cavity so that time will not be wasted trying to orient yourself. Speed is essential when operating upon infants. Keep small bowel well protected in warm saline packs. Examine the pylorus and the first portion of the duodenum at once. Follow the dilated duodenum through its course and determine the exact location of the obstruction.

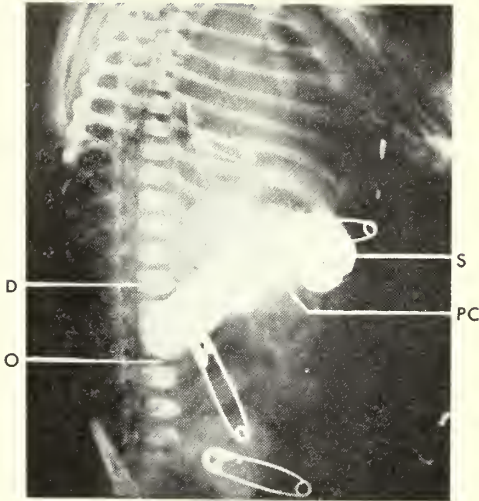
If the obstruction is extrinsic in type, and due to a misplaced cecum, mobilization of the cecum and placing it to the left of the mid-line will correct the condition. This is known as Ladd's operation, and has been well described by him. If congenital peritoneal bands are present, either in the first or third portion of the duodenum, cutting them will produce a cure.

Intrinsic obstructions result in a marked distention of the duodenum above the pathologic process.

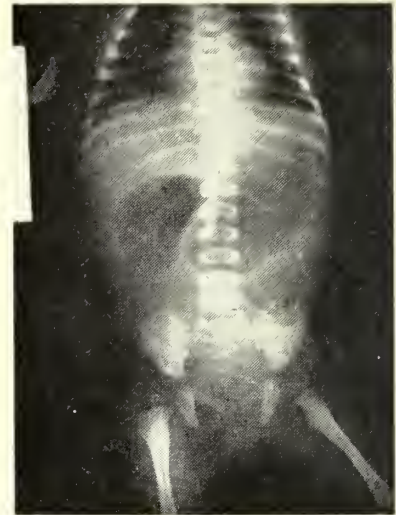
This condition requires a short-circuiting operation around the point of obstruction. If the obstruction lies above the ampulla of Vater, a gastrojejunostomy must be done. The anterior method is preferable because considerable time can be saved. If the obstruction is below the ampulla, a duodenojejunostomy must be performed. A retrocolic duodenojejunostomy proved successful in the two intrinsic obstructions I have to report. The collapsed jejunum is about the calibre of a lead pencil, and Webb and Wangenstein in 1931 devised a technic of injecting fluid or air into the collapsed bowel resulting in its dilatation and making anastomosis easier. When performing the lateral anastomosis, two rows of fine silk suture will suffice.

Quickly, return the small bowel to the peritoneal cavity and close the abdominal wall in layers, using catgut or silk, whichever is preferable. After this procedure, the infant is in deep shock, and I believe a transfusion should be given before leaving the operating table. Return the baby to an incubator and continue shock treatment. We have found oxygen helpful for the first few postoperative days.

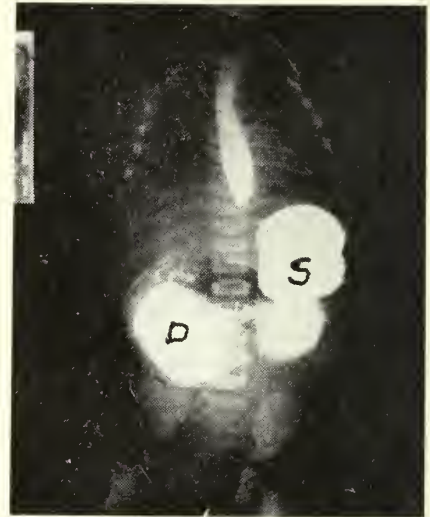
The postoperative care of most of these babies is long, tedious, and difficult. The feeding problem is a real chore and the pediatricist must be present at all times to guide the situation.



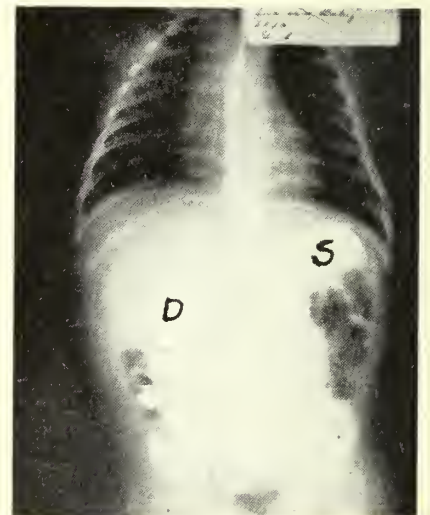
Baby Girl George
Age — 8 days
S—Stomach. P.C.—Contracted pyloric canal. D.—Dilated descending duodenum. O.—Obstruction of descending portion of duodenum.



Baby Girl Pearson
Age — 4 days



Baby Girl Pearson



Baby Boy Swenson
Age — 3 months

Baby George, our first infant in this series, who was referred by Dr. Robert L. Wilder, was submitted to the following feeding regime at his request. He outlined the indications for early postoperative feeding as follows:

1. A starving baby needs food to maintain positive nitrogen balance and prevent break-down of body protein.

2. A "fed" baby should have less gastrointestinal mobility than a "hungry" baby.

3. Passage of food through the duodenojejunostomy should favor mechanical function of the opening.

4. Presence of food to take up the digestive secretions in the stomach and duodenum should favor healing and lessen the possible deleterious effects of such secretions on the operative wound in the intestine. (The principle of the Sippy treatment of ulcer.)

5. Resumption of fluid intake through natural channels to establish normal hydrations and electrolyte balance.

I must confess that I started this feeding regime with some hesitation, but everything went along so nicely that it was instituted on the other babies with splendid results.

We started feeding these babies by tube within four hours after they left the operating table, and carried on a schedule similar to a postoperative pyloric stenosis. There was some "spitting-up" for the first few days, but after that they retained their feeding very well. After the first week, the babies were strong enough to take the bottle and carried on in this manner. The aid of the pediatricist through this session is invaluable, and I am sure that many of these babies would be lost without his support.

Ascorbic acid should be started at once to insure the best possible wound healing. In my experience, the wounds healed poorly and slowly, however, I was fortunate enough not to have an eviseration in any of the cases.

These babies will need at least one or two hypoclyses every twenty-four hours for the first week or ten days in order to maintain proper hydration and electrolyte bal-

ance. We have likewise given three or four transfusions during their postoperative stay, feeling that it gives them additional support which they badly need.

The nursing care is of utmost importance for a successful outcome in these cases, and you must have nurses who are skilled in the care of infants. After the surgery has been completed, I firmly believe that the final result lies as much in the hands of the pediatricist and nurses as the surgeon.

RESUME OF THREE CASES OF DUODENAL OBSTRUCTION IN THE NEWBORN RECENTLY OBSERVED, OPERATED AND CURED

1. Baby Girl George was seen in consultation with Dr. Robert L. Wilder, on the eighth day of life.

History—Full term normal delivery. Birth weight, 6 lbs. 8 oz. Put to breast and given water on first postnatal day. Vomiting noted within first thirty-six hours, characterized by yellow color, but no cough or cyanosis. Feedings by tube, vomiting continued. On fourth day of life, small amount of digested milk noted in stools. Sharp weight loss, and bile colored emeses continued. Lab. Bile pigments present in stool.

Diagnosis—Partial obstruction below ampulla of Vater.

X-ray barium meal—Dilatation of duodenum, marked stenosis at duodenojejunal juncture. Dr. R. W. Morse.

Comment—Clinically, symptoms of vomiting and loss of weight, in the absence of fever, suggested obstruction. Bile in the vomitus placed the obstruction below the ampulla of Vater. The presence of digested milk stool, containing bile pigments, showed obstruction was not complete. Surgery indicated.

Operation—Retrocolic duodenojejunostomy.

Result—Baby now 15 months old, development and growth normal.

2. Baby Girl Pearson, seen in consultation with Dr. Arthur Karlstrom on the fourth day of life.

History—Full term normal delivery. Birth weight 7 lbs. Vomiting noted second day of life. Vomitus bile stained. Small amount of meconium passed. Sharp weight loss.

Diagnosis—Duodenal obstruction below the ampulla of Vater.

X-ray—There is evidence of obstruction in the third portion of the duodenum with a marked dilatation of the proximal duodenum. Dr. M. Hanson.

Comment—Symptoms of vomiting and weight loss in the absence of fever suggested obstruction. Bile stained vomitus placed the obstruction below the ampulla of Vater.

Operation—Duodenojejunostomy.

Result—Baby now 15 months old, growth and development normal.

3. Baby Boy Swenson, seen in consultation with Dr. Willis Thompson.

History—Full term, birth weight 7 lbs. 12 oz. While in nursery, vomiting at frequent intervals, copious and bile stained. Discharge weight 7 lbs. 5 oz., gained ½ lb. per week for next six weeks. At six weeks of age, another severe vomiting spell, copious and bile stained. At three months of age, most severe vomiting spell, copious and large amounts of bile. Sharp weight loss. Peristaltic waves left to right.

Diagnosis—Partial obstruction below ampulla of Vater.

X-ray—Dilatation of duodenum. Obstruction at or just beyond duodenojejunal angle. Dr. W. Ude.

Comment—Intermittent attacks of vomiting, with sharp weight loss and absence of fever suggested partial intestinal obstruction. Bile in vomitus placed obstruction below ampulla of Vater. X-ray showed obstruction was incomplete. Surgery indicated.

Operation—Upon opening the peritoneal cavity, the small bowel was cyanotic, showing that a partial volvulus was present. The cecum and appendix were in right upper quadrant. The

cecum and ascending colon retained their embryonic mesentery. Exploration of the duodenum revealed the obstruction in the third portion. The duodenum was cleared and then it was apparent that a large congenital peritoneal band extended from the ascending colon, across the duodenum, and was attached at the root of the mesentery. Root of mesentery narrow. Congenital band cut between ligatures. The duodenal obstruction was released at once and gas passed freely beyond and distended the collapsed jejunum. The midgut had rotated around this congenital band, as an axis, and produced an intermittent volvulus.

Postoperative Diagnosis—Malrotation of bowel, peritoneal band producing obstruction in third portion of duodenum. Recurrent volvulus.

Result—Baby well, 16 months after surgical interference, with no recurrence of previous trouble.

CONCLUSIONS

1. Duodenal obstruction in the newborn presents a surgical problem, usually an emergency in character.

2. Progress and success in this field of pediatric surgery depends upon early diagnosis, proper preoperative, and diligent, painstaking postoperative care.

3. Co-operation between the pediatricist, roentgenologist, nursing staff, and surgeon, tends toward successful outcome for these infants.

4. Three additional cases of congenital duodenal obstruction, with successful surgical intervention, may be added to the literature.

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Involvement of the Colon in the Newborn Infant

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INVOLVEMENT of the colon by congenital strictures and obstructions in the newborn infant presents problems of the greatest difficulty both for the pediatrician and for the surgeon. The morbidity and mortality in these conditions is discouragingly high, due primarily to the fact that these young babies do not tolerate well the surgery necessary in all but the most uncomplicated cases. The following brief paper, consisting largely of notes from the histories of five such patients, may serve to illustrate the difficulties and dangers omnipresent under even the most favorable conditions.

Our first instance, Baby Boy B., is given in some detail, as it presents for the most part a classic picture of congenital obstruction involving different parts of the colon.

This child was born April 9, 1943, with a birth weight of 7 lbs. 1 oz., and began regurgitating after the first forty-eight hours. The next four days the baby gained from its birth weight to 7 lbs. 4 oz. Meconium stools were reported on the third, fourth, and sixth days, and one small brown stool from then on. The child lost weight from the sixth day, and vomited more and more. The abdomen became increasingly more distended. Laboratory findings were as follows:

April 15, 1943: Hemoglobin, 124 per cent; RBC, 6,030,000; WBC, 9,150; neutrophiles, 54 per cent; lymphocytes, 46 per cent; 1 nucleated red cell seen. April 18, 1943: Hemoglobin, 128 per cent; RBC, 5,200,000; WBC, 12,700; neutrophiles, 43 per cent; lymphocytes, 49 per cent; 7 monocytes, 1 eosinophile.

On April 14, the child's condition seemed serious enough for him to be seen in consultation. Involvement of the colon was suspected, and rectal examination (small finger) and also introduction of catheter were recommended. About 1½ inches inside rectum from anal opening, a stricture was found which felt tight as a purse-string suture about the finger. This was dilated, a catheter passed, and 10 cc. of mineral oil injected. A very small amount of food stood was obtained. Larger catheters were then passed, and a greenish, foul stool with gas obtained, with a definite decrease in abdominal distension. In spite of this apparent improvement, a cord-like mass, gas-containing, continued to be palpated in the right lower quadrant, along the inguinal ligament. The child improved, however, and began to nurse instead of being fed breast milk by gavage. X-ray on April 15, after a low barium enema, showed a moderate accumulation of fecal material and gas in the colon, with the small bowel definitely distended beyond normal. *Partial obstruction* was diagnosed; injected air showed considerable air had entered the proximal portion of colon.

In addition to the procedures mentioned, the child had been given atropine, 2 drops of 1:2,000 before feeding and ½ teaspoonful pancreatine T.J.D.

The baby was discharged without further study because it took 3½ to 4 oz. per feeding at the breast, and

was having two soft, normal (though small) stools a day. The diagnosis was *stricture of bowel*, 1 to 2 inches inside anal opening and probably 2 inches farther in. The cord-like, gas-containing mass was disregarded, though not without some argument.

On September 11, 1943, this child was admitted to St. Mary's Hospital, and a history was taken at that time of what had occurred between the age of sixteen days and of five months. The mother reported that the child nursed poorly on the breast, but that on pancreatine and breast milk, stools continued to be loose and frequent. Because of the mother's doing heavy manual labor, she was unable to continue nursing the baby, and he was put on cow's milk, and finally on evaporated milk. Immediately upon the change to cow's milk, difficulty in evacuation resulted, and hard stools were obtained. For a period of some weeks, mineral oil was given, and the child did well, having one or two stools a day. Because someone suggested to the family that mineral oil was injurious, it was discontinued. From then on for the next two months severe constipation existed, and for the last six weeks prior to admission daily enemata were given.

The present illness dated back one week, and was marked by increasing distension and difficulty of evacuation, even when enemata were given. Two days before admission, the baby refused food, and the most taken in a feeding was 2 oz. On September 11, the day of admission, the child had taken 4 oz. at the two morning feedings. He vomited after all afternoon feedings, probably emptying more than was given by mouth.

In spite of the long history, the child's condition on admission was fairly good. His weight was 12 lbs. 12 oz., temperature 98.6, pulse 110 to 120; there was a good radial pulse, the tongue was moist, turgor good. Upon general examination, the findings of eyes, ears, nose, throat and chest were all entirely negative. The abdomen was distended; on auscultation, tinkles were heard, then loud explosive gurgles. The distension was very marked. Palpation caused crying, and a mass containing gas was felt in the right lower quadrant. This seemed to "rise up" from time to time, and easily audible gurgles were noted at these times, with signs of distress to the baby.

Catheters and enemata did not aid in the evacuation of gas through the rectum. Rectal examination revealed two hard fecal balls, one ½ inch and the other 1 inch in diameter. These were removed manually. There was no sign of blood. Water was taken reluctantly by the baby, and vomited in one-half hour. The child quieted down after small feedings were begun. Hypodermoclysis, sedation and hot packs to abdomen were instituted. For the next two days, the baby continued to be distended, and vomited occasionally. Daily transfusions were given, 2½ to 3 oz., and the baby's condition continued good. No stool was obtained, other than an occasional slight amount of colored material.

The decision to operate was based on the likelihood that the general condition of the infant was certain to decline; it seemed obvious that the obstruction was in the ileocecal region, as the barium was shown by x-ray to have proceeded to this point. From succeeding events, it appears that the possibility of other involvement of the colon might not have been considered seriously enough.

At operation, the small bowel was dilated enormously—about three times the size of the colon—and it was impossible to “milk” anything through the ileocecal valve in either direction. However, when a forcep was applied to the small bowel, and then pressure applied to a small segment a few inches from the ileocecal valve, some gas could be forced through the valve. On exploration it was found that round, hard masses were present throughout the colon, but more in the transverse colon and upper part of the descending colon. These masses were considered too hard to be disintegrated—“almost like large gallstones.” Subsequent to operation, there was a stormy course, undoubtedly due to manipulation of the bowel in an attempt to crush these masses so they could be passed, as well as to the surgical procedure of dilating the colon by opening the small bowel near the ileocecal valve and the dilation of the valve itself. The result was some contamination, in all likelihood. Forty-eight hours after the operation the baby appeared to be much better, and the temperature, which had reached 106.4 on the second postoperative day, came down to almost normal. The distension continued to grow worse, although a little gas and a few lumps of fecal matter and barium and some colored particles were obtained in colonic irrigations.

On the seventh postoperative day, the condition of the baby suddenly became critical, and after some drainage from the wound, a spurt of stool indicated rupture of the bowel, followed by death.

The postmortem showed that the small bowel had burst through the incision used to insert the forceps to dilate the ileocecal valve.

The autopsy showed the ileocecal valve wide open, but the ascending colon filled with mush-like material. The transverse colon was filled with soft material and lumps, and the descending colon completely impacted with large, hard masses. This possibility had been considered as the likely result at operation, although general ileus and an ileocecal valve that had closed after dilation had been considered as causes of the obstruction with distension.

The second case was that of *Baby Boy K*, born May 4, 1943. Delivery was normal, and the baby's birth weight was 6 lbs. 9½ oz. Again symptoms developed as in *Baby Boy B*, slowly, and regurgitation was complete only on the fifth day. Slight jaundice and dehydration was noticed at the same time. By the seventh day, projectile vomiting and severe abdominal distension made treatment imperative. X-ray indicated obstruction at the ileocecal valve. At operation, because of complete ileocecal valve obstruction, ileocecostomy was performed. Postoperatively, the baby continued to give evidences of partial obstruction (though small stools and even looseness and frequency were present). These evidences were abdominal distension and much gas in the small bowel.

The child at times seemed to be doing well, and then would lose weight and strength. Gradual emaciation took place, the child dying on the fifty-seventh day.

The autopsy showed the abdomen to be the site of the difficulty. The small intestine was markedly dilated, and the point of obstruction at the time of the post-mortem examination was apparently at the place of operation. At this time, the lumen of the colon was small, and the distal colon almost entirely collapsed. Obviously the small lumen of the colon markedly affected absorption. The lumen did not change in diameter in spite of enemata and passage of food.

The third and fourth cases were alike. Obstructive signs, vomiting, distension, and evident distress were present as soon as appreciable amounts of food were taken, and it was doubtful if even meconium was observed. Obstruction was demonstrated about 1½ inches inside the anal canal, which formed a pouch ending in a cord-like structure of colon extending to the ileocecal valve. In one case, the colon had failed to rotate and the ileocecal valve and appendix were in the upper left abdomen. Both children died after laparotomy.

The fifth case was that of *Baby Boy M*, brought to the hospital with a diagnosis of intestinal obstruction. The history was of a three-day-old, full-term infant, in whom only two meconium stools had been observed. Vomiting occurred on the first day. Gavage was tried on the second and third day, but the vomiting continued, with increasing abdominal distension. No food stools had been noted. The facial expression was one of distress, with wrinkling of the forehead. The baby cried and whined a great deal. The blood picture was: Hgb. 118 per cent, RBC 5.5 million, WBC 19,300, PMNs 79 per cent, lymphocytes 17 per cent, and monocytes, 4 per cent. The abdomen was so tense that the skin was shiny. On palpation, a “resistance” was noted just to the right of the umbilicus, estimated to be 2 inches long and 1 inch in diameter. On rectal examination, a constriction was noted 1½ inches inside the anal opening. When a catheter was introduced higher than could be reached by the palpating finger, meconium gushed out around the tube in large quantities. The abdominal distension was immediately relieved and the baby within twenty-four hours was taking 2 oz. of breast milk from the bottle at a feeding. The baby was sent home, so it could nurse at the breast. (The mother had been delivered outside the city.)

SUMMARY

1. The colon may be completely obstructed—a cord-like structure—with or without rotation, throughout the bowel. The diagnosis is clinched by rectal and catheter examination—1 to 1½ inches inside of the rectum, complete obstruction is encountered. Barium injection will show a small rectal pouch.

2. Partial obstruction, due to stricture, may be encountered (a) 1 to 1½ inches inside of anal opening, where complete obstruction noted above ends. Dilation of bowel with small finger relieves this situation, although it may be associated with a second obstruction, (b) possibly of the sigmoid flexure, which responds to introduction of a catheter, and (c) an abnormally functioning ileocecal valve, manifested at birth by the palpation of

an ill-defined mass in the ileocecal region, probably the distal end of the ileum. Barium given by bowel proceeds to the ileocecal valve, and a flat plate of the abdomen shows dilated coils of small bowel, with symptoms of abdominal distension and vomiting.

3. Partial obstruction throughout the large bowel may be due to a small though patent lumen associated with ileocecal obstruction.

4. The presence of meconium stools in these children is a very important consideration, although this does not insure patency throughout the bowel, nor does it rule out partial obstruction. Apparently meconium can reach the lower parts of the bowel during early intrauterine life, and later strictures occur, causing varying degrees of obstruction.

5. Partial obstruction results in slowly developing inanition.

6. The ileocecal valve may have a profound effect upon the development and function of the colon. The

presence of symptoms of obstruction in a newborn with a mass in the ileocecal region should suggest ileocecal obstruction. The slow passage of meconium before birth, and of food after birth, may be a factor in the formation of strictures of the colon in the first instance, and *fecoliths* in the second.

7. Further investigations should yield valuable information concerning lumen formation of the large bowel, the action of meconium, and the physiology of the ileocecal valve and the colon.

Surgery in these cases of serious obstruction, complete or partial, will depend on a new approach, in which the normal physiology can be restored.

(Grateful acknowledgment is made to Drs. Raymond M. Sullivan, Ferdinand A. Zinter, Stanley R. Maxeiner, and Richard E. Pogue, who made it possible for me to see the above cases, also, to Drs. Edw. A. Regnier and Oswald J. Wyatt, who attempted to remedy the above cases with surgery.)

The Appendix as a Pediatric Problem

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IT is the purpose of this paper to discuss acute appendicitis in children, not from the standpoint of its diagnosis, nor from the angle of its treatment, but from the point of view of its prevention. The conceptions presented are based upon the conviction that this disease usually, if not always, warns before it strikes. I shall concern myself here mainly with the warnings, since once they are recognized, the course of action indicated is obvious.

As my experience in dealing with appendicitis in children has been accumulating two conclusions have been forced in focus: first, that the vagaries of the background from which it makes its appearance are too commonly encountered to be disregarded; second, that they are too varied to fit any but a very broad conception of etiology. Prominent in the history have been such complaints as nausea and/or vomiting, occasional, habitual, or viciously periodic; constipation and diarrhea (or their alternation); a premature sense of fullness when eating; abdominal pains, in character most inconstant, not only in severity but also as to duration, location and the nature of the apparent inciting cause, etc. All of these complaints have been common in the past histories of cases finally coming to operation. That they have, with monotonous regularity, disappeared after appendectomy should disavow the possibility of accident to the logical mind.

While events and the ideas they imposed were arranging themselves in my mind in that order, Wangenstein and his collaborators¹ brought into sharpest focus the obstructive origin of appendicitis as opposed to a primarily infectious one. They declared for the former, and that the sequence of events was blockage of outflow from the lumen of the appendix toward that of the cecum, accumulation of retained contents and secretions, and internal pressure. Thence follow distension of the obstructed portion, infection, tissue destruction and vascular

thromboses in more or less simultaneous, and often explosive progression, with gangrene and perforation as the climax. Presumably the process might be interrupted at any time before irreparable damage had occurred in the involved portion of the appendix by the giving way of whatever might constitute the obstructive force.

The contentions of these men seemed to form the perfect answer to the questions of etiology my observations required. Once correlation had occurred the possibility of predicting appendiceal infection gradually began to assume shape and the idea of a "crippled" appendix,² meaning thereby one anatomically predisposed to the accumulation of luminal contents, arose. It became my custom to examine the case histories of patients with frank appendicitis from the standpoint of previous gastro-intestinal symptoms and, further, to think of patients with an excess of such ailments as potential cases of acute appendicitis. The results have been interesting and not without practical value. Following are some case reports.

Case 1. A girl twelve years of age had had persistent gastrointestinal disturbances for the past seven years. These had consisted of pains of indefinite, though oftentimes violent character and accompanied or not by nausea or vomiting or both. Usually they accompanied some other type of illness such as nasal sinusitis, tonsillitis, measles, scarlet fever, etc. In spite of my feeling that a "crippled" appendix was responsible I had never been able to demonstrate tenderness in the region of the appendix until 18 months before the final attack at which time the mother was carefully warned.

The final seizure began in the usual manner and it was 18 hours before the mother recognized a rising fever and appendiceal tenderness. By the time the appendix was removed, two hours later, the proximal portion was found to be dangerously distended, inflamed and covered with exudate. The base showed severe constriction, prob-

ably congenital, and within the lumen were fecaliths and purulent exudate.

Case 2. Girl seven years of age, since infancy had been subject to attacks of cyclic vomiting of a type to cause hospitalization, severe constipation and abdominal pains. Any or all of her symptoms were precipitated at times by infectious processes, especially nasal sinusitis, the acute infectious diseases, etc., but they also occurred with no apparent cause.

I had seen the patient time after time in attacks of varied nature and never had been able to demonstrate tenderness over the appendix until my last visit. This was at the end of an occasion in which vomiting and abdominal pains had been the primary complaints. For the first time the appendiceal tenderness was present. I explained to the parents the probable existence of a "crippled" appendix and advised its removal. This was done several months later, following another series of attacks. The surgeon found an uninflamed appendix, but one that was severely constricted at the base, an anomaly thought by him to be congenital in origin. All abdominal complaints ceased after the appendectomy.

Case 3. Boy ten years of age came to me four years before with a complicated history of respiratory infections, rheumatic fever and a primary tuberculosis. Almost immediately after I first saw him he began to complain of abdominal pains of varied character. All I could find was a spastic descending colon. The patient was of a highly nervous disposition, a tendency which was encouraged by environmental conditions. The abdominal discomfort which included nausea and vomiting, interwoven with disorders subsequent to a persistent nasal sinusitis formed an almost constant complaint pattern throughout the next four years. At this time minor nasal surgery was decided upon and he entered the hospital one evening. Shortly after his arrival he began to complain of his customary stomach ache, but received little attention until early in the morning, when fever and definite tenderness were noted by the intern. By this time advanced appendicitis was present. Rupture was imminent by the time the appendix could be removed. It was found to be sharply kinked in the middle with the distal portion gangrenous and filled with pus. All abdominal complaints have been absent during the year following the appendectomy.

Case 4. A boy six and a half years of age was suffering from a nasal sinusitis of mild degree. Shortly after I saw him for the first time he developed a diarrhea which was diagnosed "stomach flu" by the mother. She seemed familiar with that complaint. There was no tenderness over the appendix when I saw him just after recovery. Three or four months later diarrhea and vomiting of rather persistent nature developed again in accompaniment of a sinus flare-up. This time I could demonstrate tenderness which was very slight over the appendix. In the hospital his vomiting and diarrhea rapidly improved, but the slight appendiceal tenderness continued. X-ray studies showed this tenderness to be sharply confined to the area in which the appendix could be visualized. Immediate appendectomy was advised but refused.

Three months later, during which period the patient

had not been acutely ill at any time but had not felt entirely well either, the parents consented to operation. At this time slight tenderness could still be elicited on deep pressure over the appendix. At operation an extremely long and twisted appendix was removed. It was not inflamed. The patient has been free of his abdominal discomforts during the nine months since the appendectomy, though he has had trouble with his nasal sinuses.

Case 5. A girl ten years of age was referred to me because of a very complicated series of complaints supposedly due to rheumatic fever. She had attacks in which she would complain so bitterly of fleeting pains in her arms or leg joints and in various parts of the abdomen that her parents became hysterical. Such tests as sedimentation rate and Mantoux were normal and I could find nothing except a spastic bowel and infected tonsils and adenoids with nasal sinusitis.

The "attacks" continued to appear at intervals for the next two months by which time I decided that the primary trouble seemed to be a recurring sinusitis with secondary abdominal symptoms resulting from spasm. Tenderness over the appendix was not demonstrated, though she was often tender elsewhere, usually over a palpably spastic bowel. Having become conscious of the relationship that often occurs between a "crippled" appendix and spastic bowel I determined to send her to the hospital for observation and gastrointestinal studies. These showed as their essential findings, a visible appendix which could be definitely determined as a spot of tenderness. (Never before had tenderness been demonstrated in the right lower quadrant.) The appendix was removed and at operation was found not to be inflamed but to be long, tortuous and sharply kinked in the middle. Both the parents and family physician say that the child has been perfectly well.

Case 6. A boy six years of age had been in bed most of the preceding winter supposedly because of rheumatic fever. During the intervening summer his tonsils and adenoids had been removed, but this fall he had taken suddenly ill with what was again diagnosed as rheumatic fever. This time it proved to be measles. However, following this illness, nasal sinusitis persisted and abdominal pains, of which the patient had complained rather persistently throughout the illness of the preceding year and for a year or more before, again appeared. A spastic bowel could be felt and in addition, slight tenderness over the appendix.

Appendectomy was decided upon but was interfered with by an acute flare-up of the nasal sinusitis. Abdominal pains continued all of the time and tenderness was always demonstrable, though slight in degree.

A month later, the patient's condition permitting, the appendix was removed. It was long, mildly injected and tightly constricted at its base. Though nasal sinusitis is still active, all abdominal complaints have been absent since the operation, and the patient's condition is improving rapidly.

Case 7. This patient was seen immediately after birth. Gastrointestinal symptoms began at the age of ten months. First there occurred vomiting associated with an acute nasal sinusitis. This progressed into a bronchopneumonia and vomiting was persistent. Later diarrhea

and vomiting appeared, usually associated with the nasal sinusitis. On one occasion it was necessary to send him to the hospital for several days to control dehydration, etc., arising from these causes.

Finally, when he was almost three, after many telephone conversations with the mother concerning the care of the usual abdominal and respiratory complaints, I felt it necessary to see the patient at midnight. He had just enough temperature to *be* temperature, but general abdominal tenderness was present. The next day he complained as before and continued to vomit. Now it did seem that he was a little more sensitive over the appendix than elsewhere but everything was very indefinite so I waited another day. As I came to his room he was walking sturdily to the bathroom and, though his temperature was 100 by rectum and there seemed to be some tenderness in the right lower quadrant I could not feel that infection of the appendix was present. However, I turned the case over to a surgeon who decided that it would be best to get rid of the appendix and set the time for the next afternoon.

By that time the temperature was 101°. An intensely inflamed and distended appendix was removed. It was found to lie far to the right of the usual location and to be bound down rigidly by a very short meso-appendix. It was ruptured during the process of removal but, after a mildly stormy course, complete recovery took place. There have been no abdominal complaints since the operation, a period of only three and a half months.

Case 8. A boy nine and a half years of age under my care since birth. Five years previously he had had his first gastrointestinal upset, consisting of vomiting and diarrhea, as an accompaniment of an acute nasopharyngitis. Following this infection nasal sinusitis became established for which the tonsils and adenoids were removed nine months later. Severe vomiting followed the operation but subsided in about twenty-four hours. Following that time for two and a half years there were periodic indefinite gastrointestinal symptoms, which consisted for the most part of unexplained pains occurring with nasal sinusitis flareups. Then a severe attack of vomiting developed. This lasted several days. Removal to a hospital for an injection of fluids was considered but was found to be unnecessary. Toward the end of this attack the patient complained bitterly of abdominal pain, but localized tenderness was not demonstrable.

Stomachache was a common complaint throughout the next year and shortly after his ninth birthday he began having severe abdominal cramps with nausea. For the first time tenderness over the region of the appendix was found. Also a rope-like descending colon could be palpated.

When the tenderness over the appendiceal region persisted, even though unaccompanied by other symptoms, it was decided to have the appendix removed. At operation a long, twisted, and tortuous appendix was removed. It was not inflamed. The patient has been entirely free of abdominal complaints since, a period of five and a half years.

SUMMARY OF THE CASE REPORTS

Eight cases have been cited (their number could be greatly augmented) each of whom has had his appendix

removed for cause. Each has been relieved of his immediate and remote symptoms referable to the gastrointestinal tract by the operation.

Our principal interest here centers around the remote symptoms, meaning thereby, symptoms of a gastrointestinal nature which had persisted without any evidence that, previous to a certain point, could relate them to disease of the appendix. They include cyclic vomiting (cases 1, 2, 7, and 8), other types of causeless vomiting, less persistent but nevertheless noteworthy (cases 3 and 4), abdominal pains of a spasmodic, sometimes fleeting, character without localized tenderness (all cases), severe and persistent constipation (case 2), premature sense of fullness with resultant loss of appetite (case 3), and diarrhea without adequate cause (cases 4, 7, and 8). Each, while often occurring alone, tended to be precipitated by all ailments attacking the individual, and often surpassed the primary disease in apparent importance.

Tenderness in the region of the appendix was accepted as the first definite clue indicating that this organ might be a factor. It was demonstrable for the first time after the onset of the remote symptoms five and a half years in case 1, seven years in case 2, four years in case 3, fourth months in case 4, seven months in case 5, two years in case 7 and four and a half years in case 8. In case 6 abdominal pain was not mentioned until about one month after my first visit. During that time abdominal tenderness had not been present, but with the first complaint of abdominal pain I was able to detect appendiceal tenderness. Whether it had been present at times of abdominal discomforts during the two or three preceding years I do not know.

Operative findings have been considered abnormal by all the surgeons performing the operations. Purse string constriction at the base was present in cases 1, 2, 6, and to a lesser extent in case 7. Here the basilar constriction consisted not so much of a circular band as of a very short meso-appendix which tied the appendix in a fixed position at an acute angle with the cecum. In case 3 the appendix was acutely kinked at its middle. That portion distal to this sharp angulation was the part involved and it was ready to rupture. In case 4, 5, and 8 the appendices were unusually long and tortuous.

Acute and dangerous inflammation was present in cases 1, 3, and 7. The parents in each instance had been warned of this possibility months to years before by the child's physician. In case 1 the mother failed to recognize the significant appendiceal tenderness for eighteen of the twenty hours before operation. In case 3 the patient was in the hospital awaiting a minor operation and the hospital attendants failed to appreciate the developing symptoms for more than twelve hours. In case 7 both parents and physician became alarmed after about two days of his abdominal complaints and shifted responsibility to a surgeon. That the case went another twenty-four hours before operation was his responsibility, not theirs, but the fact that the physician permitted this delay is ample evidence of the complexity of the factors involved.

In cases 2, 4, 5, 6, and 8 acute inflammation was absent. In each case agreement to operation was first reached between parents and the child's physician. Only

then was the cooperation of a surgeon sought, and not once out of the five instances did he feel that the gross findings at operation had not justified appendectomy. Pathologist's reports are purposely omitted from this discussion since they could, obviously, have no important bearing.

DISCUSSION

Lest those reading this paper mistake it for a kindergarten lesson in the diagnosis of acute appendicitis let me emphasize that such is not its purpose. In reporting the cases and in summarizing them it has been necessary to mention items which led to the diagnosis and to emphasize the imperative nature of the circumstances that necessitated immediate operation. I hope to make it clear, however, that interest centers on those circumstances that while preceding the possible diagnosis of appendicitis nevertheless by their presence made such a future development a reasonable prediction. It is to the degree by which the soundness of this point has been established that the worth-whileness of this effort should be judged.

Principal support for the contention that the remote symptoms have had their origin in a "crippled" appendix must come from the fact that the symptoms have been relieved after operation. Without the obstructive theory of appendicitis this observation would constitute almost the only theoretical support for that contention. That theory, however, permits speculation as to the character of the remote symptoms which has a reasonable chance of being correct. Since the final mechanism is that of complete obstruction within a "dead end" viscus it is not difficult to imagine that the earlier symptoms result from partial or temporary obstructions. Each of these attacks, then, could be interpreted as a warning that in the future obstruction will become complete and the train of events leading rapidly to gangrene and rupture will be set in motion. This is the interpretation herein accepted as the explanation of the remote symptoms in the cases presented.

If that interpretation is correct it places a large responsibility upon pediatricians for the prevention of acute appendicitis, or at least for its recognition before serious complications have developed. The remote symptoms

will not often be familiar to the surgeon, but they are the daily experience of the pediatrician or other physician caring for children. He must become aware of the existence of appendices predisposed to acute inflammation and learn to recognize the events which suggest suspicion of their presence. Then he must warn parents or attendants of the probability that one of the familiar and innocuous intestinal upsets will end in a rapidly progressive acute appendicitis.

His suspicions should be aroused whenever he meets a patient in whom intestinal (or abdominal) complaints are unduly prominent. Especially is this true if every illness regardless of its focal area is accompanied, maybe overshadowed, by complaints referred to the gastrointestinal tract. Whenever, in the observations of such a case, he is able to detect abdominal tenderness limited to the region of the appendix he is, in my judgment, justified in assuming that a "crippled" appendix is present and advising its removal at the earliest appropriate time. If, in addition, he is able to procure, through the x-ray, visual proof of appendiceal disfunction and tenderness all doubt of the advisability of early appendectomy should be disseminated.

The surgeon has perfected his technic and abilities to cope with the acutely inflamed appendix and its complication to a degree all out of proportion to the extent to which national mortality from this cause has diminished. Essential further advance in its conquest must, it would seem, come from the direction of its early recognition so that the principles that he has evolved for dealing with the problem may be brought into play early enough to attain their maximum degree of efficiency. The greatest hope for further essential conquest of appendicitis rests, therefore, in the laps of the pediatricians because it will be for them to recognize and recommend for early operation not only cases with actual infection of the appendix but those with potential appendicitis as well.

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Children's Psychosomatic Complaints and the War*

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THE influences of war cannot be ignored today in the intelligent medical management of children. Here in the United States the impact of the world conflict is chiefly felt in the loss of a member of the family to the armed forces. In England and on the continent conditions of actual combat intensify the problem.

Despert¹ in analyzing 111 reports dealing with English, French, and Russian children concludes that there is

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a definite increase in the incidence of enuresis, anxiety states, motor restlessness or instability, especially in younger children, and a questionable increase in juvenile delinquency. Gillespie² says the actual number of English children suffering psychologically from air raids has been negligible. He cites the experience in Bristol where only 4 per cent of 8,000 school children exhibited symptoms which "included general nervousness, trembling, and general aggressive behavior, and among the somatic symptoms and signs were headaches, indigestion, anorexia, enuresis, pallor, and epistaxis." Somatic disorders were

more common in children between the ages of 11 and 14. He concludes that children adapt themselves far more readily to actual war conditions than was previously credited; that when reactions do occur, they are related either to the manifest anxiety and insecurity of parents or other adults closely associated with the child or to a pre-existing neurotic tendency within the child himself.

In this country an increase in juvenile delinquency is apparent with a definite shift from the post-adolescent to the adolescent or pre-adolescent group, and the involvement of a greater proportion of girls than boys.³ An increase in venereal infections among high school students has been reported in certain areas of the country.⁴ Large numbers of students are leaving the high schools to seek employment. Educators report a greater degree of restlessness and instability in younger children, due in part to overcrowding in the classroom and an unprecedented turnover in teaching personnel. As an example, one child known to us had six different teachers in his grade during the first half of the school year!

Despert¹ reports an increase in behavior problems attributable to the war in a group of 47 children in New York City. Bender and Frosch⁷ found no marked reactions to war among 40 children studied by them. They agree, however, that any child whose everyday ties with his parents and home are already insecure might present difficulty if the war should further threaten this relationship.

To date the physical health of our children has not been impaired by the war to any noticeable extent. However, within the past year a number of children have come to the University Hospitals with somatic complaints not substantiated by careful, thorough physical studies. In some of these cases, diligent search to discover the underlying difficulty has revealed a close correlation between the complaints and the worry and anxiety precipitated by the loss of a family member to the armed forces and the resulting disruption in family life.

In illustration brief summaries of five children encountered are presented.

Case 1. A, age 2½, was admitted to the Pediatric Clinic with the following complaints: (1) loss of weight; (2) sleeping poorly; (3) excessive genital manipulation; and (4) nervousness and irritability. Thorough physical and laboratory studies were negative.

History: After the father was inducted the mother went to live with relatives. Considerable tension and confusion developed largely due to differing opinions and divided responsibility for the child's management. Her complaints began at this time. As difficulties increased the mother decided to return to her own home. The child's behavior did not improve nor did she gain weight.

After careful study, the mother was assured there was nothing physically wrong with her child and was given helpful suggestions for future management. She had an opportunity to discuss her own anxieties and worries precipitated by her husband's induction. This enabled her to deal more effectively with her own problems as well as those of the patient. The child is improving.

Case 2. B, age 14, presented complaints of marked gastric and urinary distress beginning in November, 1943. Her illness prevented school attendance. Phys-

ical, laboratory and thorough gastrointestinal and genitourinary x-ray studies were negative.

History: Onset of symptoms occurred at the time an older brother entered the army. The parents' anxiety over the loss of their son had troubled the patient more than the brother's departure. Furthermore, she never shared any of her own worries but always kept them to herself. She wanted additional interviews, but this was impossible because the mother insisted she return home.

Case 3. C, age 9, complained of partial loss of vision, staggering gait, poor sleep habits, and many vague gastrointestinal symptoms. Physical, laboratory, and x-ray studies, including consultations with the outpatient departments of ophthalmology and neurology, were negative.

History: The family had been in poor circumstances due largely to the father's poor health. Our patient was the youngest, by six years, of a family of six children. Though the presenting complaints had existed in mild form, they suddenly became progressively worse following the induction of two of his older brothers.

The patient improved when attention was directed to the underlying difficulty and the mother attained greater insight into the real nature of his complaints.

Case 4. D, age 12, complained of marked abdominal pains, anorexia, an occasional attack of vomiting, insomnia, marked weakness and malaise which interfered with social and school adjustment. Thorough physical studies were negative.

History: Long and varied succession of illnesses and complaints since early infancy. Patient managed fairly well until two years ago when her complaints increased in severity and frequency following the induction of an older brother, her favorite. She was very dependent on him and felt keenly his absence from home. Increased parental concern has complicated the problem.

The patient is under observation at the present time. In view of past history the prognosis is guarded.

Case 5. E, age 6, complained of insomnia, anorexia, vomiting and weight loss due to a self-imposed diet of several weeks duration consisting of bread and milk. Physical findings were essentially negative.

History: Patient had previously been well and healthy. As an only child she may have been "spoiled." When the father entered the service the family accompanied him to his post. Living arrangements and daily routine were not wholly satisfactory. Parental tension increased. About the time an order came to stand ready for active duty the parents had a quarrel. Following this the patient's complaints began. With the onset of symptoms, parental overconcern aggravated the problem.

COMMENTS ON CASES

These summaries briefly illustrate the development of complaints in children subjected to the additional stresses and strains brought on by the war. The difficulties in the youngest child (case 1) developed out of confusion experienced when suddenly confronted with too many persons interested in her welfare. Reinforcement of the mother's anxiety over her husband's induction was an important factor. In the remaining cases there was evidence of the patient's having been previously high-strung and nervous. In ordinary times they might have presented

no further problems, but the threatening demands of war served to increase their basic insecurities and they developed complaints.

Many fathers have already been inducted. More will be soon. As disruptive influences in family life continue a significant increase in the problems our children face seems inevitable. Many will seek refuge in developing somatic complaints and will need help. Basic physical studies proving negative, exploration of emotional tensions in the mother, the child, or both, should result in a better understanding and management of the underlying disorder.

"War or no war, the pressing needs of parents with problem children cannot be ignored. Increasing demands from parents . . . indicate that anxiety regarding their children's day to day difficulties takes precedence, even in these times, over the remoter fear of death and destruction."²

DISCUSSION

Anxiety is an unpleasant feeling state closely related to fear but differing from it in that there is no apparent external threat to the individual involved. As one of the various protective mental mechanisms, it is a normal response in certain situations. Its absence in such circumstances may indicate faulty emotional development. Excessive anxiety, however, is one of the commonest symptoms of emotional imbalance. Physicians have been aware of its importance in adult medical problems for years. Beverly⁶ states that though originally thought to be rare or non-existent in children, it is now known to be fairly common.

The sources of anxiety are manifold. Constitutional predisposition, fatigue, and impairment of physical health all play an important role. Fright and shock have been held responsible for the development of anxiety states in children. The consensus is, however, that such incidents serve only to crystallize pre-existing vague, ill-defined tensions not previously recognized. The underlying and most significant source of anxiety is the dissatisfactions which accrue from sustained severe frustrations in everyday living.

Anxiety is commonly communicated to the child by the atmosphere of the home. A worrisome mother, friction and strain between parents, expectations incommensurate with the child's ability, lack of understanding, the child's fear of the unknown, inadequate outlets for pent-up mental or emotional energies, and a belief based on reality or fancy that he is not wanted, are telling factors. Under war conditions, anxieties of adults multiplied by the uncertainties of the future, loom large.

When excessive, anxiety may be resolved (usually only temporarily) in various ways. The child may become aggressive, may fly into rages and have temper tantrums, or gradually withdraw from active participation in everyday activities and become a shy, inhibited person. He may develop somatic complaints.

Severe anxiety influences the body. During an attack, the heart beat increases, respiration becomes more rapid, perspiration is often profuse, gastrointestinal and genitourinary activity is altered, and muscle tension increases. The child may vomit, faint or exhibit some other manifestation of physical symptoms resulting from overstimulation of the autonomic nervous system.

With the appearance of such symptoms, the adult develops immediate concern, believing the child to be ill; the child gets temporary relief and security from the attention accorded him; the symptoms become more fixed, and a vicious cycle is initiated.

DIAGNOSIS AND TREATMENT

Early diagnosis is important though not always easy. In the absence of physical findings, careful attention to detail in the history and painstaking search for the occurrence of unusual threatening events at time of onset of symptoms is required. Critical review of family circumstances, atmosphere, and relationships may be suggestive. An evaluation of the child's personality and his reactions to his illness is important.

Giving the parent strong reassurance of the patient's physical condition and a frank appraisal of the total situation is the first step in treatment. Relief of parental concern and correction of faulty attitudes through discussion and explanation are essential. Attention to daily routines—sleeping, eating, recreational interests, school progress—is necessary. A judicious use of sedation when the symptoms are severe may be advisable.

As a general rule the above program will suffice for younger children. The older child often requires direct treatment during which free discussion with him is encouraged. Admission to hospital or placement in a foster home should be resorted to only in severe cases and then only when more intensive individual treatment of the child is possible.

SUMMARY

A number of children with somatic complaints not substantiated by careful physical studies have been observed. In the cases cited a close correlation has been noted between the complaint and the disturbed emotional states caused by disruption of family life due to the war. We believe the recognition of this relationship is vital to better understanding and management of these patients. General principles governing diagnosis and treatment have been outlined.

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Observations on Infantile Paralysis*

Its Symptoms and Treatment

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FOR almost four years, the Departments of Physical Therapy and Orthopedic Surgery of the University of Minnesota have been carrying on a study of the symptoms and treatment of infantile paralysis.† The attempt has been made during this time to crystallize and evaluate the concept and treatment of the disease presented by Sister Elizabeth Kenny of Australia. A preliminary report¹ was presented in June, 1941, covering the acute cases treated in the fall of 1940 in which it was concluded that the results obtained were sufficiently encouraging to warrant continuation of the study. In such a variable disease as infantile paralysis it is obviously impossible to draw satisfactory conclusions until the cases have been observed for several years. Another statistical study is being prepared at the present time but is not yet ready for publication. However, our knowledge both of the treatment method and its effect upon the course of the disease has increased and my own personal ideas have been fairly well crystallized at the present time.

Miss Kenny's concept of infantile paralysis has been summarized as follows:²

"Infantile paralysis is an acute infectious disease caused by a filterable virus in which the invading agent or its product attacks and produces varying degrees of injury, disorganization and disintegration of the neuromuscular system manifested clinically in the acute stage by:

1. *Muscle Spasm.*
2. *Mental Alienation of Muscle* (nerve-muscle dissociation).
3. *Incoordination of Muscle Action.*
4. *Muscle Weakness and Paralysis.*

"*Muscle Spasm*, the universal symptom of acute infantile paralysis, is the earliest and most important single objective finding in the disease. This is a hypertonic condition affecting the muscles, marked by persistent involuntary contraction of the muscles affected, present in every case where the diagnosis is definitely established. It is usually associated with pain, tenderness and hyperirritability of the involved muscle. Such muscles, being maintained in hypertonic contraction, are unable to relax or lengthen and tend to remain in a persistent state of shortening if untreated.

"*Mental Alienation* of muscle, or pseudoparalysis, is a condition appearing most commonly in the muscles opposed to those in spasm. Alienated muscles appear toneless and incapable of voluntary contraction but are never painful or tender, indicating that they are not the muscles involved directly by the disease. Such muscles become divorced or dissociated from the motor centers presumably by some physiological block in the continuity of the nervous pathway. Effective early treatment will restore alienated muscles to useful function.

"*Incoordination* of muscle action is a condition frequently associated with muscle spasm and mental alienation but represents a disorganization of the regulating motor centers of the nervous system. The resulting misdirection of nerve impulses considerably disturbs the smooth rhythmic action of muscles in producing orderly and effective joint motions in the region involved. Incoordination becomes permanent and seriously adds to the patient's disability unless proper steps are instituted early in the disease to combat the condition.

"*Muscle Paralysis*, or partial paralysis, represents a loss of power in all or part of the fibers of a muscle and is presumably a result of the injury or destruction of the anterior horn motor

cells of the spinal cord supplying those muscle fibers. This condition would represent an organic or structural interruption of the nervous pathway from the motor centers to the muscle. Such muscles may recover to some degree depending upon the severity of damage to the anterior horn cells. Actual paralysis or complete motor denervation of muscles, however, is not a common feature of the disease."

In this paper I would like to present my own opinion as it exists at the present time. This is not the opinion of Sister Kenny nor is it necessarily the opinion of anyone else upon the associated medical staffs. In order to present this opinion logically, I would like to present first a very brief discussion of the clinical picture of infantile paralysis as I see it.

The clinical course of the spinal type of infantile paralysis may usually be divided into three stages: the prodromal stage, the stage of increasing neuro-muscular involvement, and the stage of recovery from neuro-muscular involvement.

PRODROMAL SYMPTOMS

At first the patient complains of upper respiratory or gastrointestinal symptoms usually accompanied or followed by headache which is often severe.

The upper respiratory symptoms may consist only of a mild coryza or pharyngitis or may be very severe with chills and high fever simulating pneumonia. Fever is usually present. It may reach 105° F., but is more frequently in the neighborhood of 101° F. It may be completely absent, however, even in the presence of paralysis. Frequently at the onset the case is diagnosed as influenza because of the fever, headache, coryza, backache, and muscle pains which are present.

The gastrointestinal symptoms consist of nausea and vomiting and constipation most frequently. Diarrhea may sometimes be present. Occasionally acute appendicitis may be diagnosed during the early stages of the disease and operation performed because of the nausea and vomiting, pain in the abdomen, and muscle spasm which may even be localized in the right lower quadrant. Urinary retention is common in the first week of the disease.

Irritability is frequently present. The child does not want to be touched or held and often screams with pain or apprehension of pain when he is approached. Drowsiness and somnolence may be present for a few days. It is very rare for this to last more than five to seven days, however. If it lasts longer than that, encephalitis should be suspected.

During this early stage, reflexes are often hyperactive and the Babinski may be positive.

These prodromal symptoms last for one to six days before the muscle symptoms start to appear. Usually muscle shortening develops insidiously in muscles which have been painful before. There is no clearcut line of demarcation between the prodromal stage and the stage of muscle involvement. Sometimes new prodromal symptoms appear a week or two after the onset of the first

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symptoms and increased muscle involvement may also occur at that time. Occasionally the prodromal stage may be completely absent and the muscular symptoms may be the first changes observed.

MUSCULAR SYMPTOMS

Usually the first symptoms of muscular involvement are signs of muscle shortening. These are first shown by stiffness of the neck (shortening of the posterior neck muscles), stiffness or rigidity of the back (shortening of the back muscles), and limitation of straight leg raising, positive Kernig's sign, or positive Brudzinski's sign (shortening of the hamstring muscles). These so-called meningeal signs are usually the first to appear and are often the last to disappear. They do not at all parallel the appearance or disappearance of cells in the spinal fluid and do not correlate in severity with the quantity of cells present in the spinal fluid as has been claimed by Lewin.³

Nearly all of the usual signs described by observer's names are merely expressions of muscle shortening in various locations. Some of these are: Caverly's sign (stiff neck and back), Levinson's sign, Kernig's, Budzinski's, Ruhrah's sign (head drop), Kramer's sign (shifting position from side to side in attempting to sit up), Amoss' sign (tripod).

Most of these signs involve the neck, back, and hamstrings but other muscles may also be shortened. Some of these are the gastrocnemius-soleus group either as a whole or individually, pectoralis major and minor, latissimus dorsi, biceps brachii, flexors of fingers, adductors of thighs, tensor fascia femoris, sartorius, abductor pollicis longus, short flexors of toes and quadratus plantae, quadratus lumborum, sterno mastoids, quadriceps femoris, triceps brachii, intercostals, lateral abdominals, and the diaphragm.

The course of muscle shortening follows a fairly uniform general pattern. During the very acute stage while the patient is still showing fever, malaise, and other signs of the infective process, the muscles are tender to pressure or stretch, any motion aggravates their tendency to shortening, and severe pain may even be present at rest. Occasional patients show very little if any pain associated with the muscle shortening, but even these will usually show evidence of pain if the muscle is stretched. However, pain does not correlate accurately with muscle shortening. Pain may occasionally be present in muscles which are not short.

The shortening during this stage may be of any grade of severity. It may be so mild that it is very difficult of detection. Palpation may not show it and resistance to motion may be too slight to be detected by the average examiner. However, some abnormality of position or change in contour of the skin will betray its presence. On the other hand, it may be so severe that the patient cannot be kept in one position more than a few minutes at a time. Even powerful sedatives may not relieve it.

It is during this stage of acute spasm that the high temperature, quick-cooling fomentations advised by Miss Kenny² are most valuable. The treatment should be begun at the earliest possible moment because the shortening is most easily corrected during this stage. Great care must be taken not to handle the patient any more

than is absolutely necessary to make the diagnosis. The production of pain by movement is absolutely contraindicated.

As the disease progresses the painful hypertonicity becomes less and less evident and becomes replaced by an apparent structural change in the muscle with a lack of extensibility rather than a tendency to shortening. The muscle responds to stretching by a contraction which may be painful, but it can be moved through a range within certain limits without pain or resistance. During this stage packs of lower temperature accompanied by careful stretching of the shortened muscle are more efficient in restoring mobility to the part.

Recovery from muscle shortening may occur spontaneously especially if paralysis is not severe and is probably accomplished by natural active movement of the part. However, recovery sometimes does not occur even in non-paralyzed cases. This seems a most likely explanation for the late deformities, especially scoliosis so frequently seen after so-called non-paralytic poliomyelitis. It is most essential that normal muscle extensibility be restored if future deformities are to be prevented.

Very rapidly following the signs of muscle shortening, signs of muscle weakness may appear. Many patients never develop muscle weakness but all develop muscle shortening in some locations. I can find no correlation between muscle weakness and muscle shortening either in severity or distribution during the acute stages of the disease.

The onset of loss of muscle function may be extremely variable. Usually weakness appears in one extremity first and then another and another until the full extent of involvement has occurred. Usually there is a gradual decrease in the power of the involved muscles over a period of several hours or days until complete loss of strength has occurred. Occasionally very sudden and severe involvement may occur in a very short time so that the individual's first knowledge of paralysis comes when he is unable to walk after getting on his feet. In most instances, however, a definite period of time is consumed in the development of the muscular weakness.

When signs of the acute disease have subsided, involvement has nearly always reached its maximum. Occasionally a recurrence of fever with increase of involvement may occur. This is the rare dromedary type. There is almost never any increase of involvement after the fever has dropped to normal and has remained there for a few days.

Now the stage of recovery begins. Not infrequently some recovery occurs before the patient enters the hospital if a week or more has elapsed between the onset of the disease and hospital admission. This recovery may be both from shortening and from muscular weakness. Again there is an extreme variability both in the rate and pattern of recovery. As far as spasm is concerned, recovery usually begins first in the neck and is last in the back and hamstrings. Recovery from muscle weakness is usually pretty general for an extremity or part of an extremity, although certain muscles may lag far behind others in their recovery or may never function. There is no clinical method by which recovery may be predicted. One leg may be apparently as completely involved as

another and yet one may recover and the other never regain a trace of power.

The recovery stage begins immediately after the stage of increasing involvement has ceased and continues not only for months but often for years. However, the greatest spontaneous recovery in muscle power usually occurs within a few months. If severe muscle weakness is present after a year, it can be predicted with a great deal of accuracy that some muscle weakness will be present for many years or for life.

Recovery of useful function, however, depends upon more than recovery of muscular power. The factors of muscle shortening and rhythmic action must also be taken into account. A great deal of the muscle shortening may relax spontaneously, especially if there is power in the opposing muscle. Probably constant exercise and stretching of the short muscle in everyday duties is at least partly responsible for this recovery. Many patients, however, especially those severely involved but sometimes also the so-called non-paralyzed ones, do not undergo complete spontaneous recovery from muscle shortening. Examination twenty or thirty years after the disease in some cases has revealed that muscle shortening was still present.

It is almost the rule that untrained polio patients carry out ordinary motion in an inefficient manner, using incorrect muscles, making substitutions for weak muscles, sometimes using antagonists of the desired action. This is even more true of those who are using supports or braces even with training than in the untreated case.

POSSIBLE EXPLANATIONS FOR THE CLINICAL SYMPTOMS

This brief summary of the clinical course of infantile paralysis makes it obvious that the clinical manifestations of infantile paralysis may be grouped under three headings: (1) factors causing muscle shortening, (2) factors causing loss of muscle function, and (3) factors causing inefficient muscle function.

In order to discuss the possible or probable mechanisms of these factors, we will take them individually.

I. FACTORS CAUSING MUSCLE SHORTENING

1. *Meningeal irritation.* In the past the usual explanation for the neck, back, and hamstring shortening has been "meningeal irritation." Lewin states,³ "Stiffness of the neck is due to post-nuchal muscle spasm caused by inflammation or irritation of the dorsal ganglia, nerve roots, and meninges. This usually runs parallel with the increase in the number of cells in the spinal fluid." He attributes the stiffness of the back to the same mechanism. I cannot agree with this explanation. These signs are usually the first to appear and the last to disappear. Severe neck and back rigidity may be present when only a few cells are present in the spinal fluid or even when they are totally absent. It may be mild in the presence of cell counts of 200 or 300. Whereas the spinal fluid cell count usually disappears rather quickly, becoming normal within a week or two after the temperature becomes normal, the shortening of back and hamstring muscles usually persists for months after the acute stage of the disease is past. Kabat and I⁴ have demonstrated

that a neurogenic mechanism causing hamstring shortening is present after several months.

Therefore, it seems that some other or additional mechanism must be responsible for this muscle shortening.

2. *Hypertonus.* Some muscles seem to be continuously short as though a condition of hypertonus were present. For example, elevation of the shoulder may be the result of continuous shortening of the upper portion of the trapezius muscle. This may be present without the presence of weakness in antagonist muscles. The exact mechanism for the production of this type of shortening is unknown. It seems to be of neurogenic origin. Schwartz and Bouman⁵ found electromyographic evidence of hypertonus in many muscles in poliomyelitis; however, Watkins, Brazier, and Schwab,⁶ and Moldaver⁷ were unable to find these changes in muscles at rest.

3. *Hyperirritable stretch reflex.* Many muscles have free motion within a small range but will contract sharply when stretched beyond that range. This stretching is usually painful and the hyperirritability is aggravated by repeated stretchings. These muscles usually have innervation and are under voluntary control, but the hyperirritable reaction is not under voluntary control. All of the investigators have reported electromyographic evidence of the presence of this condition. Watkins et al⁶ state, "During the acute stage this (passive stretching) frequently brought out electrical discharges of a voltage higher than any which can be elicited from normal muscles by such manipulation. Moreover, these discharges would persist for some time after the passive stretching had been released."

4. *Changes within the muscle.* Kabat and I⁴ have shown in two cases given spinal anesthesia fourteen months after the onset of poliomyelitis that relaxation of the muscle shortening did not occur.

It is obvious, therefore, that at least in the late stages the neurogenic cause for muscle shortening has been replaced by a mechanism that resides within the muscle itself. This may be a result of fibrous tissue replacement of denervated muscle fibers, for it is well known that fibrosis frequently occurs in the late stages of infantile paralysis.⁸ It may be a myostatic contracture produced because the muscle has not been stretched to its full length over a long period of time. Or it might be a result of metabolic changes or products within the muscle fiber which prevent the muscle from being elongated. One might compare it to a rigor mortis. This might serve as an explanation for the contractures which develop in totally denervated muscles. It might be the explanation for a great deal of the so-called muscle spasm which often seems to resemble a lack of extensibility rather than an active shortening.

5. *Muscle fasciculation.* So-called fibrillary twitchings are not infrequently seen in poliomyelitic patients not only during the acute stage but sometimes for many years. During the acute stage of the disease these twitchings are usually interpreted as indicating a destructive process in the neurone which may eventuate in destruction of that motor unit.

One patient apparently had a diffuse loss of synaptic resistance, for tapping his chest with the finger would cause contraction of muscles not only in the vicinity but

also in both arms which could only be compared to strychnine poisoning. This condition was still present a year after the onset of the disease.

6. *Pain.* While muscle shortening is usually associated with pain, it is not necessarily so associated. Occasional patients will have muscle shortening without pain or hypersensitivity. One child of four years cried with pain when one leg was touched but said nothing when the other was moved about, even though the hamstrings of both legs were so short that the knees were continually flexed. It is not unlikely that the pain can be explained on the basis of changes in the posterior horns of the spinal cord which have been frequently described. Conscious pain is not the cause of the spasm, however, because we have found⁴ that intravenous pentothal anesthesia does not abolish the shortening even when the patient is unconscious. The muscle reflexes must be abolished before the shortening is relaxed.

7. *Muscle imbalance.* In the past "muscle imbalance" has been cited as the cause of deformity or shortening of muscles. According to this idea, because of weakness in one muscle the relatively greater strength of its opponent causes an increase in muscle tonus which pulls the part out of position and results in deformity. Moldaver⁷ states, "The last and the most persistent type of 'spasm' is that due to the increase of the normal tonus in strong muscles." However, both he and Watkins, et al., claim that there is no electrical evidence of such a "spasm". I have become convinced that muscle imbalance as a cause of muscle shortening is a myth. If the shortening is treated adequately, muscle imbalance may be present to a marked degree without causing deformity. We have a number of patients where a weak or "zero" muscle is opposed by a strong muscle with no tendency toward deformity. Another argument against this idea is the fact that some of the worst contractures occur in muscles with no volitional power at all. This has been not only our experience but also that of Steindler, Russin, Sheplan, and Wolkin.⁹

In fact, we do not find that muscle shortening has any relationship to muscle power. A muscle which is severely shortened may have any degree of voluntary strength from nearly normal power to complete loss of power. Likewise its opponent may have any degree of volitional strength from normal power to absolute lack of strength.

From this discussion of some of the factors causing muscle shortening it is obvious that the subject is very complex and is not well understood at present. A great deal of careful study and research will be required before the subject can be thoroughly understood. It is my conviction, however, that muscle shortening or "spasm" as it is called by Miss Kenny is a positive entity which should be treated energetically and overcome completely if the patient is to obtain the best possible functional result.

II. FACTORS CAUSING LOSS OF MUSCLE FUNCTION

Loss of muscle function may be temporary or permanent, partial or complete. The onset of paralysis may be sudden or gradual. Usually it develops during the febrile stage of the disease. It is not ordinarily sudden and widespread but develops in one extremity and a day or so later develops in another extremity. The involvement is

characteristically "spotty" in distribution. It may involve only a few muscles in an extremity or it may completely involve the extremity. It is usually not symmetrical in distribution.

Recovery of function may occur spontaneously or only after extensive retraining. Recovery has usually been explained by the supposition that the virus has invaded the anterior horn cell and has injured it enough so that the cell has ceased functioning. However, if the virus did not destroy the cell completely, it recovers function spontaneously after a variable length of time. Other explanations have maintained that edema due to the inflammatory changes present has interfered with function by pressure on the cell, and subsidence of the edema causes recovery of function. Loss of blood supply with anoxia of the anterior horn cell has also been used to explain the spontaneous recovery in poliomyelitis.

Sister Kenny has demonstrated that motor nerve pathways may recover without spontaneous return of function. Very careful retraining and re-education of muscles is necessary before function will return in these cases. She has designated this condition as "mental alienation," a very unfortunate term because it implies a psychologic cause of loss of function which is not justified by the clinical observations. As stated above there seems to be no correlation between clinical muscle shortening (spasm) and loss of function either in that muscle or its antagonist. Therefore, I would conclude that the idea of "mental alienation" is incorrect.

The factors that cause loss of muscle function may then be listed as follows:

1. *Complete denervation.* This would result in permanent complete paralysis, with no recovery possible. Fortunately this apparently rarely if ever occurs. Some small number of muscle fibers retain enough innervation so that minimal function seems to be present. I have yet to see a patient with one good leg who has been unable to walk without braces on the bad leg if treatment were started early and carried on persistently.

2. *Partial denervation.* Some muscles or extremities never regain full strength. These are assumed to have suffered destruction of a sufficient number of motor units so that complete return of power does not occur. However, these muscles may be trained to useful function in most instances.

3. *Temporary denervation.* Some muscles are temporarily paralyzed but recover function after a variable period of time. These may be divided into two classes (a) Those that recover function spontaneously. These include by far the greater number of cases. (b) Non-functioning muscles that need re-education. Some muscles lose function for some reason and go for a long time in a non-functioning state but can be retrained to function months or years later. These are the muscles that really come under the heading of "alienation". I believe that the psychologic mechanism rarely if ever occurs. These muscles may have lost their power to function by any of several mechanisms: (1) the virus may have injured the cell but not destroyed it. The cell could then recover but not function until retrained. (2) The virus may cause a disturbance in the synapse which prevents function until retrained. (3) There may be dam-

age to associational or internuncial neurons which might destroy established pathways so that re-education is necessary. Whatever the mechanism, this condition does occur although it is not frequent.

4. *Mechanical causes.* Sometimes muscles cannot function because their antagonists are so shortened by the disease that they are placed at such a mechanical disadvantage that useful movement is impossible. These muscles are often also partially denervated. With recovery from the muscle shortening which may be spontaneous or only after extensive treatment, function returns. The return of function in the anterior tibial muscle after an operative lengthening of the tendo achillis is a striking example.

How much of the paralysis of poliomyelitis is due to factors which cannot be influenced by treatment and how much is due to factors which can be treated successfully can be determined only by long continued observation of cases with and without satisfactory treatment. I doubt that any really satisfactory conclusions can be drawn in less than ten years.

III. FACTORS CAUSING INEFFICIENT MUSCLE FUNCTION

In infantile paralysis, as in other conditions involving disturbances of the neuromuscular apparatus, there are factors present which tend to decrease the efficiency of muscle function. Whether these factors are a result of pathologic changes within the Central Nervous System or are merely expressions of peripheral weakness as claimed by Watkins, et al.,⁶ and Moldaver,⁷ is immaterial from a clinical point of view.

Watkins⁶ has shown simultaneous action currents in agonist and antagonist in poliomyelitis and has called it "disturbed reciprocal innervation." This may be a good term.

The clinical facts are that without muscle training the poliomyelitis patient usually attempts to employ any and all muscles indiscriminately in performing any difficult action, thereby decreasing rather than increasing the favorable results of the attempted motion.

If the patient is allowed to have his own way he will use the strong muscles and neglect the weak ones, thereby making his plight worse rather than better. Careful training under manual control by an experienced tech-

nician, however, may increase the efficiency of muscle function by:

1. Eliminating interference from shortened antagonists.
2. Developing maximum power in weakened muscles by insisting that the patient use the weak muscle instead of the stronger one which could be substituted for it.
3. Training the antagonist to relax while the agonist is functioning.
4. Developing rhythmic action to the ultimate degree.
5. Keeping up the patient's morale and enthusiasm during the long and tedious process of recovery.

CONCLUSIONS

1. A brief resume of the clinical course of the spinal type of infantile paralysis is given.
2. Muscle shortening is a positive entity in infantile paralysis and is an important factor in the final functional end-result. The emphasis laid upon muscle shortening by Sister Kenny is an important contribution to the treatment of infantile paralysis.
3. "Mental alienation" is probably only a minor factor in infantile paralysis and is probably not psychologic in origin as thought by Miss Kenny.
4. Maximum efficiency of muscle function within the limits imposed upon it by denervation is the aim of treatment and the explanation for the good results obtained.

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Book Reviews

Feeding Babies and Their Families, by HELEN MONSCH and MARGUERITE K. HARPER. New York: John Wiley & Sons, Inc., 386 pages, 1943, price \$3.50.

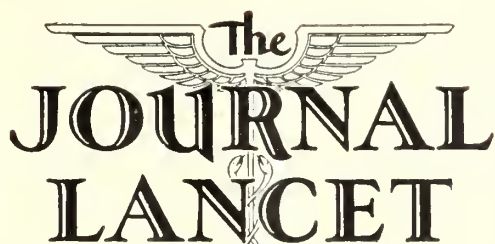
This book presents an interesting approach to the subject of nutrition. Not only is there up-to-date information for the feeding of the infant and small child, but all the factors which may influence feeding also are considered. In addition, the background for the infant's state of nutrition is emphasized and the future of the child's nutrition is revealed in its relationship to the other members of the family who live and grow along with the child. With so many books on feeding now available, it is fairly difficult to present one which is both interesting and edu-

cational. However, the authors have been able to put forth something which really appears to be new in the field of nutrition. The information which they have gathered and the interpretations which they have made are accurate, scientific and of practical value. The book is highly recommended.

A Safer World for Babies, Evaporated Milk Association, Chicago; 16 pp., 1944.

A booklet especially about feeding the baby; designed to help the mother follow instructions which the doctor will provide. It discusses what evaporated milk is, the preparation of formulas, what utensils are needed, supplementary foods prescribed by the doctor and gives some hints on baby care. The distributors intend that this piece of printed matter shall save time for the doctor and insure his instructions being heeded. Available free on application to the Association, 307 N. Michigan Ave., Chicago.

(Continued on page 170)



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LIVING MONUMENTS

William James once said "The great use of life is to spend it for something that outlives it."

That is exactly what the members of the medical profession are doing every day and in a double measure. They spend their lives not only for that which shall survive them in this sense but in order that others may live. Hence they may, in a measure, be accredited with some of the future accomplishments of those whom they have saved. Pediatricians, according to this line of reasoning, have the edge on the rest of the fraternity because their patients have a longer part of their life span remaining and the sum total of their possibilities is accordingly greater.

The picture entitled "The Doctor" has probably had more widespread appeal than any other painting. The central theme is thoughtfulness on the part of the physician as he studies the symptoms of the sick child lying

in the bed before him. Naturally he looks for changes of color on the face, rhythm and frequency of respiration; he listens for unusual sounds, the expiratory grunt of pneumonia, the air hunger and characteristic breathing of laryngeal diphtheria. He is pleased at observing restful sleep and disturbed by the appearance of nervous twitchings. All this guides him in the treatment of the patient. But in addition to these purely professional considerations he is doubtless meditating too upon the potentialities in that little body. He is aware of the high hopes that the grief-stricken parents must have for their child whose life is now endangered and intrusted to his care.

Many are the benefits handed down to future generations by great men and women in their times. Nearly everyone strives to leave something of a material kind to surviving members of his family. But to no other class in like manner is given the special function of furthering the extension of life itself.

A. E. H.

EMBARRASSING GUESTS

Today many physicians of the not-too-old group look back on their postgraduate adventures in Vienna and Berlin as the high point of their medical training. No one can deny that American medicine and our medical schools owe an enormous debt to the Germany that was. Medical teaching in our schools was revolutionized when in the 80's William Welch brought back from Europe Germany's methods and there is not a school in the country today that does not owe most of its success to the laboratory teaching first developed in Germany. Up until World War I the famous German and Viennese clinics were the Mecca of all medical graduates. Came the Fuehrer and with him the final blow to Germany's medical leadership. But by a curious ironical twist, Germany has now presented America with another great gift, this time that of many, perhaps most, of all Europe's creative minds. There is scarcely an acre of the American fields of science and art that has not been energized and made more fruitful since the mad dictator started out to make over the world. Consider that already eleven Nobel Prize winners have become American citizens, two of whom are famous physicians; Dr. Karl Landsteiner who classified human blood into its four types, and Dr. Otto Myerhof, the Berlin biochemist.

We have scarcely begun to realize the benefits this gift of Herr Hitler's will bring American culture. Relatively little publicity has been given the thousands of exiles now Americans and working for us in military matters, or to those quietly carrying on their research in our universities. The absorption of these men and women who had won fame in their own countries has presented no problem. We are proud to have them. But there is nevertheless an embarrassing feature to this gift of Hitler's. And to the medical profession the most embarrassing is the 6,000 physicians, most of them highly trained and potentially of great value, who have come to us penniless but eager to prove their worth, and who somehow must be absorbed by us. Nearly 100 per cent are either already American citizens or are in the process of becoming such. Of these 6,000, Germans and Austrians make up 84 per cent; 73 per cent of these were graduated before 1933 and hence cannot be suspected of having been infected by Hitler's brand of science. Three thousand have been placed by the National Committee of Resettlement of Foreign Physicians and other agencies, in hospitals, laboratories and private practice (mostly in rural communities). But there remain 3,000 who are barred by legal restrictions from professional work. It is the problem of their absorption that has aroused often bitter controversy within medical groups all over the country.

To the average layman this additional supply of doctors at a time when the cry for more medical men rises from both military and civilian throats, seems like an answer from heaven. But to American doctors it is far from being that simple. Many are seriously disturbed lest they will return from their war services to find themselves crowded out by the foreign invasion. All over the country measures are being discussed and adopted to "protect" American doctors from the threatened foreign competition. Innumerable hurdles and fences are erected

to hold it back. In about half the states full American citizenship and a year's internship in an American hospital is required before the examination for a license can be taken; in Minnesota, North and South Dakota and Montana no foreign school is "recognized", and hence graduates of foreign schools cannot take the examinations; the National Board of Medical Examiners have imposed so many restrictions that actually only a few present themselves as applicants.

To the hundreds of exiled physicians congregated in the great cities on the Eastern coast, supported by philanthropic societies or friends, waiting and longing to fill our demands so that they may use their skill and training, these restrictions doubtless seem as vascillating and confused as does our foreign policy to so many of our commentators. It would seem that some clear-cut country-wide policy will have to be formulated, and perhaps it will be if our hospital staffs continue to be depleted and the need for medical service in urban and rural communities keeps growing. But thus far the only suggestions that have been offered have been unsatisfactory makeshifts. Let us hope that American doctors will find a solution before the public wrathfully demands that the government find one. M. U.

BOOK REVIEWS—(Continued from page 168)

A Manual of Endocrine Therapy, by BERNARD L. CINBERG, B.A., M.D.; Brooklyn: Chemical Publishing Co.; 178 pages; 1942. Price \$3.25.

This little book is a condensed discussion of dysfunctions of endocrine origin and their treatments.

The first portion of 122 pages gives a review of the treatment of diseases or malfunctions of the various endocrine organs. At the end of each chapter there is a list of preparations used, giving their trade names and their manufacturers, which is an excellent idea.

The next 42 pages are devoted to a brief discussion of diagnostic procedures. The next 12 pages summarize therapy.

The whole effect is an excellent note book on endocrinology, covering the subject succinctly and inclusively. It should prove valuable to the busy practitioner as a ready reference.

Pain, Proceedings of the Association for Research in Nervous and Mental Diseases; Vol. 23; Research Publications, Baltimore: Williams and Wilkins Co.; 468 pages, 116 illustrations and 19 tables; 1943. Price \$7.50.

A volume comprising a most excellent and complete review of the subject of pain. It is made up of a series of well-chosen topics by well known investigators. The individual subjects are described in a brief and concise manner. The experimental material is well integrated with its clinical applications, thus greatly enhancing the value of these studies, particularly for the clinician. This treatise also contains complete comprehensive reviews of such widely used procedures as rhizotomy, tractotomy, and chordotomy. Since "pain" in almost every region of the body is discussed, this book should prove of great value to physicians in almost all fields of specialty.

Pain, by SIR THOMAS LEWIS, M.D., F.R.S.; New York: Macmillan Co., 192 pages, with index, bibliography, illustrations; 1942. Price \$3.

This book presents a fairly condensed resumé of the mechanism of human pain. The review has been correlated with numerous observations from the author's own experimental work. Considering the subject, this treatise is surprisingly easy to read. Since the clinical applications are not emphasized, this book will be of greatest interest to those particularly interested in the field of neurophysiology.

News Items

Dr. E. L. Touhy of Duluth, Minnesota, was elected president of the Minnesota State Medical association at its annual meeting held in Rochester, April 12 to 15. Dr. S. A. Slater of Worthington was elected first vice president, Dr. J. A. Bargaen of Rochester, second vice president, Dr. B. B. Souster of St. Paul reelected secretary and Dr. W. H. Condit, Minneapolis, treasurer.

Dr. L. W. Backett of Big Timber, Montana, was elected president of the Park-Sweet Grass Medical society at a recent meeting held in Livingston. Other officers elected for the year are Dr. Dan R. Bennett, vice president, and Dr. Eloise M. Larson, secretary-treasurer.

Dr. R. P. Peterson of Butte represented Montana cancer control agencies at the American Society for the Control of Cancer at its annual meeting in New York City.

Dr. J. L. Yuhas of Missoula, Dr. Fred J. Hemernik of Billings and Dr. A. W. Ide of Glendive were licensed by reciprocity by the Montana state board of medical examiners at its semi-annual meeting.

Following to be last item

Captain I. L. Schuchardt of Leola, South Dakota, has been given an honorable retirement from the Medical Corps because of physical disabilities incurred while serving in the Pacific area. After a rest he will reopen his practice in Aberdeen. Captain Schuchardt volunteered for service early in 1942 and was commissioned a first lieutenant. He served in Australia, New Zealand and New Guinea where he participated in the Papuan campaign. He holds two unit citations from General MacArthur. He was returned to this country in 1943 and was hospitalized at San Antonio, Texas. He has now rejoined his family in Aberdeen.

Captain Arnold H. Hohf, graduate of the School of Medicine at Vermillion, South Dakota, and of Rush Medical College in Chicago, is now stationed in the Nettuno sector in Italy. Captain Hohf's hospital unit served for six months in French Morocco, Africa, and was transferred on January 31st to Italy.

Dr. John F. McKie who came to Hot Springs, South Dakota last summer from Sturgis, has joined the medical staff of the veterans' administration facility and has reported for duty at Milwaukee. Dr. McKie held a captain's commission in World War I.

Dr. Franklin T. Younker has moved from Galesville, Wisconsin, to Sisseton, South Dakota, where he has opened an office. He was active in conservation work and a member of the board of county commissioners while in Galesville.

Vice Admiral Ross T. McIntire was the main guest speaker at the meeting of the Minnesota State medical meeting held in Rochester April 13, 14 and 15. The admiral spoke to the scientific session on the control of tropical diseases, and at the banquet, Friday evening, he spoke of the services of the Navy doctors on ships and in hospitals in saving the lives of fighting men.

Dr. Paul Dressel of Elkton, South Dakota, has been promoted to the rank of captain in the medical corps. Dr. Dressel is stationed in the Sierra ordnance depot at Herlong, California.

At a meeting of the Northwest District Medical Society held at Mobridge, South Dakota, April 2, 1944, Dr. W. A. George, Selby, was elected president, Dr. A. W. Spiry, Mobridge, vice president, and Dr. L. D. Harris, Mobridge, secretary-treasurer. Dr. J. E. Curtis, Lemmon, was elected delegate to the state convention. Mr. Lloyd C. Way, U. S. Public Health Service, presented a prepaid method plan for low income group, which provoked considerable discussion.

The Watertown District Medical Society held a dinner meeting, at the Lincoln Hotel, Watertown, South Dakota, Thursday, April 6, 1944. Dr. R. G. Mayer, Aberdeen, South Dakota, talked on "Hematuria", illustrated with lantern slides, and Dr. Owen King, Aberdeen, South Dakota, talked on "Fractures of the Hip," illustrated by a motion picture film demonstrating his technic in operating fractures of the hip.

Lieutenant Charles Hunter Sheldon explained and demonstrated the use of the ultra-rapid color cameras for observation of the brain in head injuries, recently developed at the naval medical center at Bethesda, Maryland, to the members of the Hennepin County Medical society at its meeting April 3rd, in Minneapolis.

Dr. F. J. Hill, former superintendent of the North Dakota state board of health, has been appointed successor to Dr. F. E. Harrington, retiring as Minneapolis' commissioner of health.

Dr. W. A. George of Selby, South Dakota, was elected president of the Northwest District medical society at its meeting held in Mobridge April 2nd, succeeding Dr. J. E. Curtis of Lemmon. Other officers chosen were: Dr. A. W. Spiry, vice president, and Dr. L. D. Harris, secretary-treasurer.

Necrology

F. W. SCHLUTZ, M.D.

The death of Dr. F. W. Schlutz in Chicago on March 8, will bring not only sorrow to his old friends in the Northwest, but a renewed appreciation of the major part he played 34 years ago in establishing Minneapolis as one of the first cities in the country to inaugurate clinics in infant care. Dr. Schlutz came to Minneapolis from Vienna in 1910 where he had been taking graduate work in pediatrics and almost at once started an infant welfare clinic at one of the settlement houses, acting as its physician. In that year 104 babies out of every 1,000 died during their first year. That this figure has been reduced to 24 is due largely to the heroic efforts of Dr. Schlutz and his associates. For several years he was head of the department of pediatrics at the University of Minnesota which he left to take a similar position at the University of Chicago. His teachings have inspired thousands of students and his reputation as a pediatrician has spread throughout the country.

Dr. Willoughby G. Dye, 71, formerly of Deer Lodge, Montana, died in Los Angeles, April 1. Although Dr. Dye and his family moved to California twenty years ago he never severed his association with Montana and two years ago revisited Deer River, his native city.

Dr. J. G. Stone, 62, Montrose, South Dakota, died suddenly from a heart attack at his home March 31.

Dr. H. B. Beeson, 62, formerly of Grand Forks, North Dakota, recently of Racine, Wisconsin, died at his home in Racine, March 20. Dr. Beeson was a well-known horticulturist and a member of the Masonic fraternity.

Dr. William de la Barre, 72, Minneapolis, died at his home March 26. Dr. de la Barre had come to Minneapolis in 1878 and practiced medicine in that city for 37 years.

Dr. Rudolph M. Gunderson, 63, Lake Park, Minnesota, died at his home April 2. Dr. Gunderson was a graduate of Hamline university and the University of Minnesota medical school. He practiced in Lake Park 31 years. He was a member of the Mystic Shrine and was company physician for the local division of the Northern Pacific railway.

Dr. Hildus Augustine Ness, 72, Mabel, Minn., died in the Lutheran hospital in LaCrosse, Wisconsin, April 4. Dr. Ness had practiced in Mabel for 46 years.

Dr. John Jay Ogg, 81, Marshall, Minn., died March 22 after a long illness.

Dr. John William Campbell, 68, of Fargo, North Dakota, died April 13 at his home. Dr. Campbell, born in Hanover, Canada, had practiced medicine in North Dakota more than forty years.

Future Meetings

SOUTH DAKOTA STATE MEDICAL ASSOCIATION

Sixty-third Annual Session

May 21, 22, 23, 1944

Marvin Hughitt Hotel, Huron, South Dakota

Sunday, May 21—First meeting of Council, 2 P. M. First meeting of House of Delegates, 8 P. M. Smoker and stag party for all members and guests, 9:30 P. M.

Monday, May 22, 1944

7:30 A. M.—Committee Meetings.

9:00—Motion Picture—Gastric Ulcer.

9:30—Is Vaccine Therapy of Value in Allergies of Children?—A. V. Stoesser, M.D., Minneapolis, Minn., Associate Professor of Pediatrics, University of Minnesota Medical School.

10:15—Hydronephrosis: Diagnosis and Treatment—Frederic E. B. Foley, M.D., St. Paul, Minn., Clinical Associate Professor of Urology, University of Minnesota Medical School.

11:00—Intermission.

11:15—Comments on the Usefulness of Various Anesthetic Agents—John S. Lundy, M.D., Rochester, Minn., Head of Section of Anesthesia, Mayo Clinic.

12:00—Lunch.

1:30 P. M.—Presidential Address—J. C. Ohlmacher, M.D., Vermillion, S. D., Dean of Medical School, University of South Dakota.

2:00—Chronic Mastitis in Its Relation to Cancer of the Breast—Harry A. Oberhelman, M.D., Chicago, Ill., Professor of Surgery, Loyola University School of Medicine.

2:45—Intermission.

3:00—Indications for Bronchoscopy in Pulmonary Disease (with motion pictures)—Paul H. Holinger, M.D., Chicago, Ill., Professor of Otolaryngology, University of Illinois College of Medicine.

3:45—Medical Leadership in Public Health—C. C. Applewhite, M.D., Kansas City, Mo., Director, District No. 7, U. S. Public Health Service.

4:30—Intermission.

5:00—House of Delegates Meeting.

6:30—Annual Banquet—President J. C. Ohlmacher Presiding.

The Agenda of Post-War Medical Practice—C. M. Wilhelmj, M.D., Omaha, Neb., Dean of School of Medicine, Creighton University.

Prepayment Plans for Medical Care—William F. Braasch, M.D., Rochester, Minn., Member Board of Trustees, American Medical Association, Member National Physicians Committee.

Tuesday, May 23, 1944

8:00 A. M.—Council Meeting.

9:00—Motion Picture—Gastric Ulcer.

9:30—Hysterectomy: Selection of the Appropriate Operation for the Particular Case—Virgil S. Counsellor, M.D., Rochester, Minn., Associate Professor of Surgery, Mayo Foundation, University of Minnesota.

10:15—Complications in the Urinary Tract During Pregnancy—William F. Braasch, M.D., Rochester, Minn., Head of Section on Urology, Mayo Clinic.

11:00—Intermission.

11:15—A Comparative Radiologic Study of Primary Atypical and Bacterial Pneumonia—Major George H. Stein, MC, Sioux Falls, S. D., Radiologist, Sioux Falls Army Air Field.

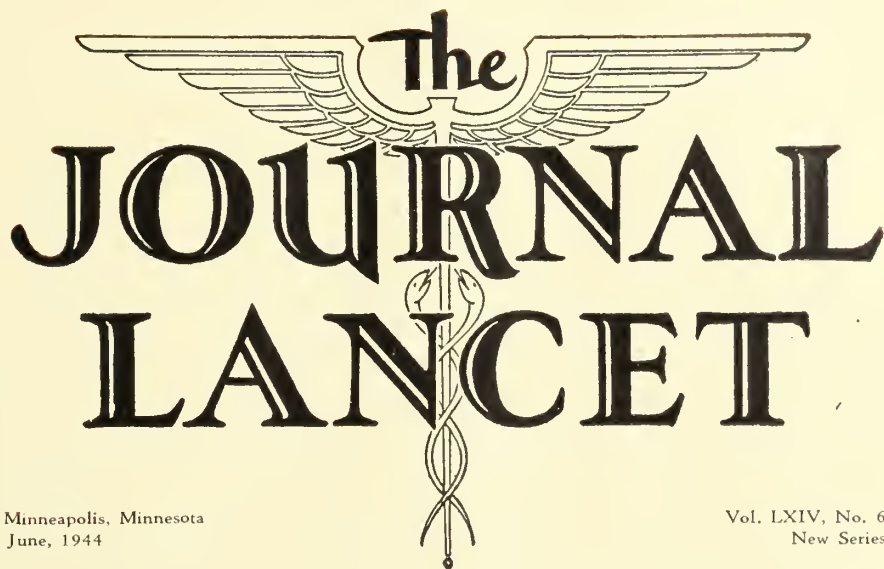
12:00—Lunch. Round Table Discussion of X-ray Films. N. J. Nessa, M.D., Sioux Falls, presiding. Major George H. Stein, Leader.

1:30 P. M.—Address of President-Elect—D. S. Baughman, M.D., Madison, S. D.

2:00—Some Interesting Aspects of Aviation Physiology and Medicine—Lt. Col. Saul Michalover, MC, Sioux Falls, S. D., Chief of Medical Service, Sioux Falls Army Air Field.

2:45—Placenta Abruptio, H. E. Harvey, M.D., Lincoln, Neb.

3:30—Adjournment.



Minneapolis, Minnesota
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Vol. LXIV, No. 6
New Series

Nutrition in Geriatric Medicine*

E. L. Tuohy, M.D., F.A.C.P.

Duluth, Minnesota

THIS panel on geriatric subjects reflects the current interest[‡] in the aging. Helping older people to comfort, efficiency and safety is sufficiently appreciated so that the "pamphleteering" or problem-deciphering stage may be curtailed. It is time to assemble some factual data. Leadership in medicine is promoted by the work of specialists; it is well for the general practitioner to observe how each author in this series views the problem of age and its visitations; likewise to review the references and where possible consult them. It is well for each practitioner to reobserve his own patients in terms of the new approaches gleaned from the literature. Much that is not readily understood and appreciated when general problems are posed becomes plain when demonstrated and proven to exist in our own patients. An example of this is the awareness we now have of mouth, tongue and lip lesions characteristic of malnutrition, since Spies, Sebrell and others have been writing about malnutrition and the avitaminoses. We do not see undernutrition in massed groups, as displayed in the routine anemias of Puerto Rico or among the pellagrins of our Southland; but we do have many individuals, living in the midst of plenty who show various degrees and modifications of malfeeding. We may state that the mouth has become the barometer of human nutrition.

*From the Department of Internal Medicine, the Duluth Clinic.
‡This interest is as necessary as it is timely. Our Minnesota population has increased 200,000 in ten years; but in that time the number of children under 15 has gone down 50,000; the number of people over 60 years has increased by 70,000—almost the same number now living at age 75 or over!

THE RAPIDLY ACCUMULATING LITERATURE ON NUTRITION

I¹ would appreciate it if the reader would first condescend to read my Chapter XIX in the *Handbook of Nutrition* recently published by the American Medical Association under the auspices of the Council on Food and Nutrition. This friendly gesture will render unnecessary much repetition; it affords space and opportunity for discussions and contributory amplification in a field where the individual human consciousness desires full consideration. You may lead horses to water, but they drink according to mood; except under the urge of famine the choice of food, like religion, is a very personal matter. This thought is expressed, directly and indirectly, many times in Stieglitz's² excellent book on Medical Geriatrics just published. Some reviewers comment that not all the forty-six chapters are equally well authored and written. This fault is inescapable in any book compiled from many authors, and is antidoted by the completeness in which all the bodily organs and physiological subdivisions are presented in terms of age and aging. Thewlis³ and Boas,⁴ individual authors, have excellent books on geriatrics, but the references to food and nutrition are not quite specific enough. The problem of age and what the process is, is best outlined in Cowdry's⁵ compilation. Among the contributors thereto the reader will find our leading physiologists, chemists, biologists, agronomists and general scientists. No one can possibly

escape the philosophical and economic connotations inextricably associated with the problems of human aging: juvenescence versus senescence; virility versus wisdom. The late Lewellys Barker weighs these issues delicately and masterfully. His chapter is an essay that deserves fellowship with the "Senectude" series of Cicero and Osler. But no matter how we sift the evidence concerning age as a process, it faces us with obvious reality. It is right there in the mirror; and as we survey it the oppressive and astounding realization obtrudes; despite the longer span of life now the rule, it is the last half that seems to run so much faster than the first. Where have the years gone? Like a gasoline tank still registering one-half or one-third full, the driver is constantly reminded that the promise of mileage recedes!

FOOD AND LONGEVITY

Inheritance counts most in longevity. With a genetic inheritance assembled by fate, many a voluptuary has become a nonogenarian. The converse has expedited many superbly disciplined and cautious folk toward an early demise. Man lives for other purposes than do the lower animals. Even the leaders of Teutonic Might have had shrunken arms and clubfeet, not to mention subthalamic intellects. The purpose for which animals live in the wild state or are bred domestically differs very fundamentally from that of human beings. Certain insects mature, copulate and die all in one day. The adult May fly is not equipped with a digestive tract; its short span of existence makes such unnecessary. The elephant is an anachronism; its procreative powers and propensities in its "last hundred years" have not been widely publicized. A short life and intensive reproduction is the policy and life cycle of rodents, fish and fowls, as well as that of our chief forage concentrators—the domestic animals to which our nutritional indebtedness is so great. Much that is offered in nutritional pamphlets aims, however, to translate to the feeding of people the schedules established in laboratories for feeding rodents, dogs or pigs. Animals are fed, to be eaten in turn by some other creatures. Man is fed to further his processes of thought quite as much as to maintain his bodily machine. There is a very great human advantage, for example, in fattening up hogs for the kill. Certain races feel the same about dogs. We know that obesity offers some impediment to longevity with man;

§ "Present day life extension is not due entirely to preventing disease or even to limiting of wars. Improved standards of living have played a part. A book emphasizing this fact has recently been published, 'Hunger and History' by Prentice. This challenging title was chosen by none other than the son-in-law of the late John D. Rockefeller. He has conducted an experimental farm at Mount Hope, near Williamstown, Massachusetts. His experiments have been designed to increase the productivity of the soil and of his live stock. Through breeding and proper—not increased—feeding, his hens have increased their annual productivity from 160 to 220 eggs per bird and the milk output of his cows has been increased from 8,000 to 12,000 pounds per cow.

"Prentice has sought out evidence on how people lived in the Middle Ages, and evidence of the rigors faced by Stone Age man. His historical researches show that in England, between 1201 and 1600, there was an average of seven famines per century; that, due to faulty harnessing, three or more oxen were required to pull a small plow; that ancient 'feasts' would make a cheap cafeteria look like a gourmet's paradise. He mentions a recipe for bread including ground bark, acorns and sawdust, and a suggestion that newborn kittens were good substitutes for crab. He points out that it was only with the advent of the Industrial Revolution (presently so much condemned) that man, with the aid of lower animals, for the first time in twenty-three centuries had food enough to eat, and that this status was attained because the people had freedom. Freedom meant food. Grimly one sees dramatized in the contemporary world the destruction of food. 'Guns before butter.' "

but the debilitating influence of underweight has not been stressed sufficiently. It is commonly stated that most populations of the earth have never been adequately fed. Ill feeding is widespread in the United States, but many doubt some of the sweeping figures offered by department of labor statisticians. Man has been conditioned to starvation rather than to opportunities for surfeit. I⁶ outlined these ideas in some detail in a previous article. The reference is appended, and a footnote is added, with a paragraph[§] which was excerpted (in part) from Prentice's⁷ monumental work. Evidently man has eaten anything and everything that crawls or flies; the bark of trees, groundup clay, and items too revolting to mention. The name "bread" has been given to almost anything that might temporarily keep the walls of the stomach separated or raise the level of sugar in the blood.

The Industrial Age (so often condemned) gradually eliminated endemic starvation; periodic local famines came for the same reason that large populous areas, such as Russia and India, have had them in recent years. Inherited memories (instincts) of these horrible episodes have been a great factor in hoarding of food or indoctrinating a people into the spirit of natural aggrandizement in order to secure first call on food supplies and the instruments for their production. These aggressive appetites may well be subconscious residues that make the present-day problem of treating obesity a psychiatric chore. Carlson calls it the most common "form of malnutrition." It is evident that satisfactory nutrition is not based upon simply extending life, but aims to broaden life in terms of comfort and accomplishment. Fantastic aims for enforced security in old age are meeting up with monumental difficulties with the population shifts away from farms to urban industrial centers.

FOOD AND DISEASE

The medical approach to dietetic guidance has been heavily weighted by the attempt to fit a choice of food to a disease rather than to maintain nutritional balance at all ages and under all circumstances. This represents a great advance; it is well illustrated by the present-day treatment of all fevers, including typhoid. We feed the patient despite his disease. For short illnesses, temporary compromises are obviously the rule; but look for trouble where anatomical, physiological or mental interruptions to food ingestion obtains for more than ten to twenty days. The blight of cancer (especially of the gastrointestinal

¶ E. C. Aucher (see refs. 8, 9) heads research for the United States Department of Agriculture. We would all do well to read his own articles and many of the scientific pamphlets issued by the department in Washington, D. C. For example, in the reference appended he writes: "Many of us came from farms originally (and some of us would like to be back there again). But we are not on farms; in fact, there are now only about four farm families in the country to each twenty non-farm families. China still has nineteen farm workers to one non-farm worker—exactly where we were in 1787." He might have added that this circumstance also arises from a problem in "food economy" in terms of soil productivity. Live-stock demands acreage for range or fodder. Four times as many people can be "fed" from an area where the population subsists on products direct from the soil rather than on items processed through animals. There is no rationing of meat in India, where most of the people never had much. So when we ask for a "higher protein diet, high in meat and animal foods" we are automatically ordering an expensive diet. Living standards, economic sufficiency, ability to get and hold jobs—all accumulate to plague industrial developments even as famines periodically decimate isolated primitive peoples. If people must herd into industrial centers, then some permanent planning for "victory gardens"—so important in war time—should be encouraged. We should possibly acquire more interest in using vegetable protein (soy bean) in our diets.

tract) and of alcoholism is resident in the withdrawal of ordinary foods or their failure to attain the liver for ordinary resynthesis and storage. A standard text on diets of twenty-five years ago has a grotesque setup that attempts, for example, to specify a particular choice of dishes for "acute gastritis"—not to mention even more fanciful digressions in terms of "gastroptosis" and "nervous indigestion." Great acclaim followed a Washington chemist's* blasts against "food adulterants", especially benzoic acid. In retrospect this worthy movement seems to have had the intention of keeping people from ingesting that which might be acutely harmful, rather than questioning the public or private servicing of foods lacking in essential nutritive and protective qualities. The control of water and milk supplies illustrates what I mean. It is now taken for granted that all such are routinely safeguarded from bacterial contamination, not only at the source but also every contact that precedes ingestion. This is the health contribution that came after Pasteur. It is the basis of much disease prevention, fostering and developing mass action. The diarrheal diseases of infants have been wellnigh eliminated; tuberculosis among adolescents, arising from bovine sources rarely obtains with us; typhoid fever and amebiasis (in non-tropical areas) are controlled. Most advances in present life extension stem from these mass preventives rather than from any notable prolongation of life after the period where geriatrics is considered.

We have much knowledge about supposed "causes of death."† Not all the testings are trustworthy. Take, for example, the pneumonias. At a recent pathological conference, debate arose over the fitness of applying the term "pneumonia" to the death of an elderly subject with the usual museum assemblage of defective organs and blood vessels. The pathologist described the heavy lung; the alveoli aberrantly loaded; the bronchial passages oozing bloody fluid. The clinician said he was just "an old man dying." Hobart Reimann¹⁰ (with every right to speak) affirms that view. Because a hypertensive patient happens to show glycosuria in the later weeks of life is a poor reason to clutter up vital statistics with totals for "diabetes" that belie the true definition of that term. Then, when we apply such terms as "arteriosclerosis" or "atherosclerosis", as if they truly represented entities which a mode of life or diet could postpone or circumvent we begin to challenge many dicta — the most obvious of which is "A man is as old as his arteries." Why is he *old* and why his arteries? (See page 187 of this issue, Henry L. Ulrich.)

Out of Mother Russia comes presently the most astounding simplification. Bogomolets¹¹ and his students are offering a serum that is said to be as all-effective against infection, disease and tissue degeneration as is Stalin's arms against Hitler's greed. He traces most physical vicissitudes back to menenchymal trauma; reticulo-endothelial apathy or futility arising from inadequate

stimuli to phagocytic offense—a failure to resist because of destructive agents. We should recall that our vascular tree is menenchymal. The one hundred fifty years of life promised by Bogomolets (with his serum) opens a vista of "old soldiers homes" as extensive as our present munition factories.

FITNESS AND FOOD

Why is the press and the air full of news and talk about life and efficiency in terms of vitamins and food? How much of the radio advertising is founded upon any facts? Each reader (I hope) will have his own answer. Herewith I put down some of my own conclusions, for the most part without argument or amplification. If you put faulty gasoline into your car, it seems unfair to blame the motor. Let us keep this illustration in mind when we study food in its relationship to disease.

1. We have witnessed since the turn of the century what has been accomplished in the feeding of infants and children. It is a surpassing accomplishment. Simms¹² has estimated that if the same rate of death should continue as obtains with our ten-year-olds then life span would extend to over 500 years!

2. There are, beyond any doubt, large areas in our own country where deficiency diseases abound, even in essentially prosperous times. These may be statewide in some areas; but we have much of the same so-called "marginal land" in Minnesota, Wisconsin and Michigan.

3. Studies made of peoples living in these lands, especially in our southern states, have opened our eyes to food deficiency problems as a whole. The war in Spain, with its ghastly upheavals of all regular services, soon brought to that sunny land evidences of blighted childhood and almost universal malnutrition. In these areas the specific benefits of food and vitamin specifics were abundantly demonstrated.

4. We have come to recognize signs of endemic deficiencies in individual patients—especially those ill or living stressfully. For many it is unavoidable. Yet in the midst of plenty many remain ill nourished. One of the famous "Freedoms" is supposed to change all that; to take all the combat and competition out of living, as nations and peoples espouse perpetual peace—and mediocrity.

5. Albrecht^{13,14} and the agronomists have long been telling us that we are not recognizing the soil factor in edible foods (for man and animal); and too much credit has been given to salubrity of climate as such. Those interested should look up the references I append. A new soil produces foods well balanced with minerals and trace elements. Our best soils are wastefully farmed, and leached by erosion. Millions of acres, according to Auchter, are now beyond salvage for agriculture and are only good for growing trees.

6. Perhaps that is another reason why "pioneers" had better teeth and kept them into their old age. This problem of the teeth at all ages is pressing for solution. That is the reason that as editor of his series of articles I have arranged for you to have the benefit of Professor Pippin's great experience. (See page 203. Verily the medical and dental professions must work more closely together. One need only recall the circumstance that

*Harvey W. Wiley pioneered in the very essential field of guiding public and legislative opinion toward establishing our present "Pure Food and Drug" controls.

†A careful checking of all deaths reported of patients formerly treated at the Duluth Clinic since 1915 shows that about 50 per cent are dying of chronic cardiovascular disease, including cerebral hemorrhage. Eighteen per cent are dying of cancer with much overriding of associated pathology representing age accumulations.

among our "best fed" families the number of children with soft teeth or malocclusion is notorious; the tooth decay among our young military recruits seems scandalous. What an impediment to gustatory efficiency and satisfaction to carry over into that senescence already obfuscated by so many conflicts!

7. Faddism in eating. I have found no way to separate this item from its background of the neuroses. Recently a neuropsychiatrist has set forth the claim that obese individuals often become so by the circumstance that food ingested allays their anxieties. Fatigue and anxiety are closely related. Fatigue is usually lifted after eating. So many obese women with conflicted lives eat too often and forget to admit it to their doctors or to themselves.

Oppositely, many thin folks are food conscious and feel every olive they eat; some even to the point of "showing it." Nature has munificently distributed the greatest varieties of foods about the earth. Everyone should cultivate a sincere interest in food—calorically, vitamin content, culinary skills in terms of economy as well as esthetic serving. The matter of relative happiness and freedom from bickering and rehashing of the maldevelopments of the day or year deserve first place in every family planning. Mealtime is the best place for proper parental adjustment to become Exhibit A in the presence of observing offspring.

8. Whenever habits are discussed food is rarely considered. Alcohol and tobacco first come to mind. Baneful drugs—well, that conjures up narcotic agents and sleazy associates. However, faulty food habits are the most universal of human defections.

(a) Most well poised and efficient people eat and enjoy a substantial breakfast. It is a glorious habit, both in its acquisition and maintenance. In late adolescence and early middle life is the time to acquire it. To keep it one cannot become an inebriate; when it is truly zestful the use of tobacco is postponed to later hours. For many (especially underweight, nervous women) it should be tabooed.

(b) Some protein (despite the expense) is a prime essential. Eggs, bacon or ham; an occasional chop or serving of liver. Chew the protein well and taste it. That will cure many nervous hypoglycemics; the crew that craves "cokes" all through the day.

(c) Fit your intake (see average requirements listed in footnote) of carbohydrate and fat to your build and type (family inheritance); your work activity and seasonal demand. Remember that fat makes all food taste better. Some people may be harmed by excess fat, especially if they have a family tendency to vascular accidents.

(d) In states of relative health three meals should be taken. Liver storage is best adapted to that rule. The elderly feel better if the chief meal (dinner) is taken at noon. Those who starve all day and finish off with one big meal are ill advised. Constipation—an incessant bugbear—is no more a problem of the aged than the middle aged. Proper habits and avoidance of cathartics are the answers. So much for habits. I firmly believe that they

must be acquired early in life to lend to old age its greatest prospect of comfort and efficiency.

9. There has been a definite purpose in leaving out of this discussion explicit directions as to what the elderly should or should not eat. These are the reasons:

(a) Basically the elderly should be given food allowances commensurate with their activities. It should be a standard balanced diet. The bodily tissues are ever in flux. They must be restored by fresh protein. Many of the protein subdivisions are as "essential" as any of the vitamins.

(b) Many should be encouraged to keep up or increase their protein intake rather than to limit it. This includes even those with true nephritis.

(c) Too often the elderly are left alone and tend to "eat off a shelf" (Castle). Proper (small) nursing homes for the aged are a pressing need.

(d) The maintenance of adequate teeth (or proper restoration) is far more important than the ill advised exodontia offered as a panacea for most of the ills of the aging.

(e) Our office desks are surfeited with excellent brochures (often with splendid colored illustrations of skin or mucosal inadequacies) giving exact figures of the caloric and vitamin content of various ordinary foods. Most of them are derived from public documents, the result of food analyses and investigation. I append one that is simple and informative.

(f) When for any reason disease or mental infirmity supervenes then we have the excellent laboratory procedures that enable us to find out exactly whatever deficiencies exist and what is needed. This is particularly noteworthy in estimating probable protein deficiencies through estimating the total proteins in the blood. This is a relatively simple laboratory procedure. Wangenstein (see page 180 of this issue) points out the way to circumvent the nutritional deficiencies in gastrointestinal malignancy. If it is possible in the presence of that severe disorder to restore patients to a point where extensive surgery is safely performed, then few other situations should make circumvention impossible. Parenteral feeding and medication are now used so much among our hospital patients that it has become necessary to pass the procedure over to especially trained nurses. Gradually the pharmaceutical houses are giving us very useful protein preparations (Amigen), and some forms are adapted for intravenous use. We have come to use a considerable amount of dried milk powder for its casein content. In either health or disease nature's own formulations are the best, both in terms of content and interrelationship. Omnivorousness (Carlson) is the greatest safeguard for man. In this munificent land this facility should expedite wholesome living among our older age groups. That should test our ingenuity in treating the aged. All too long doctors have followed the technic of the distracted mother with a brood of ebullient children: "Go and find Johnnie and whatever he is doing tell him to stop"! So in almost any illness we write on the chart "Bland diet." Milk does not build up to a soft diet. It leaves too little residue; it imposes too much fluid in terms of caloric content.

10. Professor Wangensteen (see page 181) has shown how to utilize higher protein intake to safeguard gastrointestinal surgery.

The following is a good example of a medical situation where dietary manipulation has been most felicitous:

A woman aged 59 had been on a low protein diet following a doctor's advice. She developed edema of the extremities and ascites; dyspnea cough and enlarged liver pointed to cardiac decompensation; anemia headache and vomiting together with blood pressure elevation up to 200/120, but with eyeground changes still classified as "severe benign" hypertension—painted the general clinical picture.

From the standpoint of choice of therapy the laboratory findings were determinative.

(a) She had four plus albumen and many granular casts; and a few red blood cells in the urine.

(b) The urine specific gravity ran close to an isostenuria: 1010 to 1014.

(c) The blood: hemoglobin 9 grams (62 per cent); red blood cells 2,970,000; leukemia 6200.

(d) The urea nitrogen and creatine were 32 milligrams and 3.7 milligrams per cent respectively.

(e) The plasma protein totalled 4.2 grams per cent. (Serum albumen 2.4 and globulin 1.1.)

She was given blood plasma, a series of transfusions, high protein diet (meat, eggs, fish, cottage cheese, dried milk powder, and brewer's yeast; at times she took a packet a day of Knox Gelatine stirred into tomato juice). At no time has she failed to show four plus albumen in the urine; but as she is maintained at 6.5 to 7 grams per cent of total blood protein she has no edema. She has very little dyspnea and most of the time her blood pressure is only 160/110! She is doing her housework and has

‡ THE DAILY REQUIREMENTS OF THE BODY — ADULT

1 ounce = 30 grams 1 milligram = 1/1000 gram 1 microgram = 1/1000 milligram 1 kilogram = 1000 grams (2.2 lbs.)

	Protein Grams	Fat Grams	Carbohydrate Grams	Calcium Grams	Iron Milli-grams	Vit. A I. U.	Thiamine Micro-grams	Ribo-flavin Micro-grams	Niacin Milli-grams	Ascorbic Acid Milli-grams
ADULTS: Moderate Activity										
Man (154 lbs.) or 70 kilograms	70	135	375	.8	12	5000	1800	2700	18	75
Woman (134 lbs.) or 60 kilograms	60	111	312	.8	12	5000	1500	2200	15	70

CHART* WHEREBY TO CHECK UP ON YOUR VITAMINS

Adequate Daily Vitamin Requirements

	I. U.	Micrograms		I. U.	Micrograms
	A	Thiamin (B ₁)	Ascorbic Acid (C)	D	Riboflavin (G or B ₂)
For Moderate Activity, Age 50 to 70	5,000	1,800	75,000	Not Known	2,700
Milk, 1 glass	464	128	5,200	4	520
American Cheese, 1 oz.	900	14	—	—	150
Egg, 1	500	75	—	7	165
Calf Liver, 1 oz.	2,100	63	10,000	3	495
Butter, 1 tablespoon	360	—	—	12	—
Cream, 1 cup medium	3,008	80	3,680	—	416
Apple, 1 medium	75	45	10,000	—	30
Dried Apricots, 12	3,333	60	2,000	—	72
Banana, 1	300	45	10,000	—	90
Grapefruit, 1/2	21	75	40,000	—	100
Lemon Juice, 1/2 cup	—	60	56,000	—	—
Muskmelon, 1/2	—	116	60,000	—	150
Orange, 1	225	110	54,000	—	54
Pineapple, 2 1/4 slices	63	158	25,000	—	68
Prunes, 6	840	120	1,200	—	330
Strawberries, 13 medium	75	25	38,000	—	—
Broccoli, 1 sauce dish	9,000	111	35,000	—	225
Cabbage, 1 sauce dish	—	75	30,000**	—	45
Carrots, 1 sauce dish	3,850	150	2,000**	—	150
Lettuce—Green, 1 sauce dish	1,850	88	14,000	—	172
Lettuce—Iceberg, 1 sauce dish	355	8	14,000	—	112
Lima Bean, 1 sauce dish	500	345	15,000	—	300
Peas—Canned, 1 sauce dish	—	250	6,000	—	—
Peas—Fresh, 1 sauce dish	1,000	420	12,500	—	195
Green Pepper, 1	5,000	30	62,500**	—	120
Lean Pork, 1 small serving	—	945	—	—	216
Potato, 1 medium	30	120	6,500	—	45
Sweet Potato, 1	3,500	90	10,000	—	90
Spinach, 1 sauce dish	25,000	120	37,500	—	375
String Beans, 1 sauce dish	1,200	75	7,500	—	108
Tomato, 1 medium	850	93	2,300	—	50
Whole Grain Bread, 1 slice	—	96	—	—	30
Whole Grain Cereal, 1 sauce dish	—	114	—	—	42
Macaroni—Dry, 1 sauce dish	—	11	—	—	—
YOUR DAILY TOTALS					
	Protects eyesight; aids growth; resistance to infection.	Healthy nerves; aids growth, appetite.	Better teeth and bones and wound healing.	The "sunshine vitamin" especially required in winter.	Healthy skin; aids digestion, clears up cheilosis.

*Adapted from the Tufts Medical School Food Clinic; so ably guided by Frances Stern.

**Double this if eaten raw.

few periods of discomfiture. She retains the same organic pathology now that was present two years ago when my physiological evaluations dictated a choice of diet based upon the deficiencies proven by laboratory tests.

11. Vitamins. § History will class the American rush to the drug and department stores for vitamins that characterizes this period of global conflict with what a Bill Stern might have spied as he accompanied DeSoto on his Fountain-of-Youth quest. Young people will come to associate war news and political forecasts with what B Vitamins do to sell bonds, alleviate constipation, effect an understanding of the Russian economy or preserve falling hair! It is useless to marshal sarcasm to teach greater selectiveness or advance economies. We will just have to live through the pandemic of advertising and pamphleteering. The medical profession will have to share the blame for this sudden explosion of health-made-easily-and-to-order, because doctors have prescribed little else of late and have temporarily veered away from vaccines and estrogenic shots. Still this is not quite fair. Many people are now gaining an interest and knowledge about foods that would not have come without the vitamin introduction; and frequently they have very great value. I like to use this illustration: "One does not put chains on the wheels of a car except to get out of a tight place—mud or snow. Chains are of no use on a good firm road or pavement. In like manner when you are getting a well balanced general diet you do not need special vitamins or combinations thereof." Most people understand that approach. I¹⁵ have reported on some specific instances where objective diagnostic procedures showed what parenteral thiamin chloride accomplished in acute gastrointestinal physiological breaks. Spies has repeatedly asked the profession to search out their clientele for the telltale skin and mucous membrane evidences that are decidedly specific (mouth, tongue and lip lesions that are due to lack of riboflavin, for example). There are now nine proven subdivisions under B: thiamin, riboflavin, nicotinamid, pantothenic acid and para-amino benzoic acid, pyridoxine, biotin, choline, inositol. To these

§ See appended chart.

two more have recently been offered by the Wisconsin researchers. It is true that not all of these are proven to be needed by man; but if they are good for chickens no one can deny that chickens are good for men. Then choline may prevent fat accumulation in the liver (alcoholics take notice); but biotin just possibly could stimulate growth in general and cancer in particular. But a recent American Chemical Society announces "a master chemical called a methyl something." That's the stuff in wood alcohol that is so deadly. But it seems the good methyl is only found in protein food. Its associates in the protein molecule tames it down so that it (like oil in a motor) just keeps our vital organs at top function. The Chemical Society seconds my advice "a wide variety of food insures your getting sufficient methyl!" and everything else—at all ages. See Professor Pippin's seconding of all this in terms of teeth and gums (page 205).

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Abdominal Surgery in Old Age*

Including Comment on (1) Use of Sipper; (2) Safety of Multiple Simultaneous Operations; (3) Mechanism of Development of "Bed Sores"

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"OLD AGE is an incurable disease," said Seneca, a contemporary of Christ. The intervening centuries have not changed the truth of this statement. Whereas advances in medical knowledge have increased the life span and more people have been permitted to grow old, there is no proof that people live to be

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older. Adventurers, who seek the fountain of eternal youth, meet the same fate as overtook Ponce de Leon. Efforts directed at making the lives of men happier rather than their years longer would appear a worthier objective.

Surgeons who deal with the ills of the aged have in mind both objectives; lengthening the lives of their patients and adding to the happiness of these increased

years. The pitfalls obviously are numerous, for each of us is as Samuel Johnson said, upon the voyage of the ocean of life. All that Hope, our constant associate and most sanguine and confident companion, ventures to promise the most favored of us in this sojourn, is not that we will escape death but that our craft may be among the last to sink.

Elderly, ill patients, in need of surgery, frequently are only too fully aware of the futility of making elaborate preparations for a voyage, which they know can only be of short duration. Moreover, they are filled with apprehension over their ability to withstand the surgical measures necessary to fit them to continue the voyage. Often, they find themselves unable to decide to accept the proffered help and their sinking ships continue to submerge while they are making up their minds. If the opinions of their mature children are sought, who see more clearly than they that, if their parents can be rescued from their sinking vessels, yet the inevitable is not far away, not much encouragement is afforded the irresolute parent wavering on the brink of an important decision.

These are important considerations to which the surgeon, enthusiastic over what he believes he can accomplish for his elderly patient, must give serious heed and careful attention. The surgeon often must take pains to clarify the situation to both the patient, the person most affected by the decision, as well as relatives. Only rarely then, will patients decline sound advice offered in a kindly way. The old and the young look upon life from the opposite ends of the telescope; to youth, it seems immeasurably long; to the old, very short. Life insurance figures, however, suggest that the expectancy of the life span in the upper age brackets is an item of real help to the surgeon in persuading his patient that further preparation for continuance of the life voyage is worthwhile.

TABLE 1
(From Dublin²—Longevity in Prospect and Retrospect)

Age	Additional Life Expectancy in Years	(Of 100,000 Persons Born Alive the Number in This Column Indicates Survivors)
70	9.22	42,091
75	7.03	29,637
80	5.27	17,339
85	3.94	7,713
90	2.88	2,371

To the patient suffering pain, surgery comes as a welcome relief allaying all apprehension—whether the disorder needing correction is a malignancy, a fracture, biliary or intestinal colic, or urinary retention from prostatism. It is the elderly patient, without serious subjective disturbances who is reluctant to accept surgery without reassuring advice. The most compelling circumstance urging operative correction in such situations is usually a malignancy.

THE INCIDENCE OF MALIGNANCY

Approximately 10 per cent of all males and 13 per cent of all females die of malignancy. Cancer is the second most frequent cause of death, being superseded only by diseases of the vascular system. With increasing years, the incidence of malignancy increases rapidly and deaths owing to cancer mount steeply. Cancer takes a toll of approximately 150,000 lives annually in the registration

area of the United States. By far the largest toll is taken by cancer of the alimentary canal in both males and females. Malignancy of the female generative organs and breast accounts for the greater number of deaths from cancer in the female. Cancer of the stomach accounts for approximately one-third of all deaths from neoplastic disease. Livingston and Pack³ (1939) state: "There are more deaths from cancer of the stomach than from all malignant tumors of lip, tongue, cheek, tonsil, pharynx, larynx, salivary glands, thyroid, male and female breast, ovary, uterine cervix and corpus uteri combined."

NEED FOR DEMONSTRATION OF PRECURSOR LESIONS
HARBORING INSIDIOUS MALIGNANCY

There is no symptom complex that serves to identify cancer of the stomach. The disease is so insidious that, by the time the diagnosis is made a fairly large proportion of the cases are inoperable. A more intelligent approach to the problem would appear to be attempts at identifying some of the precursor lesions from which such malignancies develop. In the instance of gastric malignancy, it would appear that patients with pernicious anemia, gastric polyps and atrophic gastric mucosa from whatever cause, are particularly likely to harbor forerunners of gastric cancer. Similarly, the blood relatives of patients who have gastric cancer should be kept under scrutiny as being more likely to have gastric cancer than other adults. Approximately 3 to 4 per cent of adults will die of cancer of the stomach. Whereas the annual death rate from cancer of the stomach for all ages in the United States registration area is 30 per 100,000, in the upper age brackets, the mortality rises from 400 to 500 per 100,000 or approximately one death in every 200 men and women between 70 and 80 years. Gastric resection in the precancerous stage would salvage a far larger number of lives than can be achieved by the recent policy of treating the patients as they present themselves with the well-developed clinical picture of gastric cancer.

In the resected stomachs of patients operated upon for gastric cancer, in whom ostensibly a radical and complete excision of the disease has been done, but in which excised specimen residual microscopic cancer is demonstrated at the line of resection, we are beginning to be able to compile some objective data on how long the disease may remain silent. In this group of patients, the malignant transformation has occurred already. Yet, fifteen, eighteen, twenty-one and even twenty-four months elapse not infrequently in such patients before the clinical evidences of gastric malignancy recur.

And so similarly with colonic and rectal malignancies. Undoubtedly the larger number originate from antecedent polyps. Efforts should be directed at developing a program to identify these lesions while the condition is still remediable in the majority of instances. A clearer definition of which patients may harbor the precursor lesions of such malignancies will result in an important salvage of life. The cooperation of the patient obviously is necessary.

THE SURGEON'S PROBLEM IN OPERATING
UPON THE AGED

Increasing years augment the surgical risk, primarily because, apart from the surgical situation under consid-

eration, very few persons are otherwise quite sound. In other words, the additional risk is reflected directly in the increased likelihood of coronary thrombosis, hemiplegia or other complications which can not be averted and which occur about as frequently, during the time the patient is being prepared for operation as after. Granted the patient can be prepared satisfactorily for operation, however, apart from the extra hazards just enumerated, formidable operations can be performed on the elderly with reasonable risks, not far out of line with those run by standard risk patients of the mid-life span.

THE IMPORTANCE OF PRECISION PRINCIPLES IN
PREOPERATIVE, OPERATIVE AND POSTOPERATIVE
MANAGEMENT OF ELDERLY PATIENTS

Much of the latitude which we permit ourselves in the management of surgical patients is accounted for in the tolerance for abuse by young, strong, standard risk patients. In consequence, many of our criteria of management are ill defined. A more crucial test of whether a given premise is rational is afforded by the elderly, border-line risk patient. Clinicians are very prone to say, when things go wrong: "Despite everything that was done, the patient died." It probably would be fair to say that the following statement is more often in accord with the truth: "Despite what was done, the patient did well"—only another way of emphasizing that not everything that is done for the patient actually helps him. Every ill patient has his physician and the disease to reckon with! When dealing with elderly, border-line risk patients, it is important that all procedures in the preoperative period, during operation and in the postoperative period be carried out with precision technic.

The importance of hydrating patients adequately and maintaining a satisfactory electrolyte balance are items that have been stressed a great deal. Equally important, however, is maintenance of an adequate caloric and nitrogen intake. In this clinic, we have learned important lessons from the precepts of Ravdin⁵ and Whipple⁴ and their associates, in the preparation of patients for operation. My associate, Dr. Richard L. Varco,⁶ has given these matters particular study and it has been very gratifying to note how liberal the dividends of this effort have been.

With reference to gauging the risk of operation in a patient who is in need of formidable surgery, probably the most important question that can be asked the patient is: "How much weight have you lost?" Any patient who has lost more than 10 per cent of his body weight should have a period of feeding of a high protein and carbohydrate diet, low in fat for a period of approximately a week prior to operation. Patients who have lost 25 to 35 per cent of their body weight demand approximately three weeks' feeding to prepare them for operation. Patients who have lost much weight have necessarily been autocannibalistic, subsisting on their own stores of fat. Meanwhile, too, the protein reserves have been depleted. Such patients are poor operative risks, and if operated upon only after restoration of water and electrolyte balance and repair of an existing anemia frequently behave badly during operation. The blood pressure fluctuates considerably and it is frequently difficult



Fig. 1. Use of the Sipper in feeding patients with pyloric obstruction or greatly reduced pyloric capacity. With the Sipper at bed level and the patient lying, the energy consumed in the process of the patient feeding himself is very small. Patients who exhibit evidences of retention when fed an ordinary diet or on taking the ordinary Sippy regimen, in the main, do very much better if they will sip fluids in small amounts more or less continuously all day long as is illustrated here. For the preoperative preparation of patients who have lost considerable weight, we employ the diets outlined by my associate, Dr. R. L. Varco. They are fluid in character and are taken readily through the Sipper. Partial submersion of the container in a larger basin containing ice keeps the fluid mixture nice and cool. If the patient does not take an adequate amount of the Varco diet by means of the Sipper during his waking hours, he is fed additionally by intragastric drip through an indwelling duodenal tube at night. If the obstruction at the gastric outlet is complete, the patient must be fed intravenously.

or impossible to sustain a satisfactory blood pressure level and recourse must be had to intravenous infusion of blood or plasma in quantity, despite the fact that very little blood has been lost. Such patients usually have a fatty liver and their intolerance of formidable operative procedure is very characteristic. Death from pneumonia early in convalescence is not unusual, and at autopsy a fatty liver exhibiting areas of necrosis is frequently the only other significant finding. The daily preoperative feeding of 4,000 to 6,000 calories of a diet rich in protein and carbohydrate but poor in fat causes the fat to disappear from the liver of the autocannibalistic patient. Physically, the patient gains in strength; he looks better and feels better. And when fed for a period proportional to the weight loss (as suggested above) he stands protracted formidable operations very well.

Patients who exhibit obstruction at the gastric outlet may be fed by the "sipper" (see Fig. 1) or the intravenous gastric drip. If the pyloric obstruction is absolute or nearly so, obviously, the patient will have to be pre-



Fig. 2(A). Mrs. A. B., University Hospital No. 725261, aged 82. This patient had a carcinoma of the stomach with obstruction at the pyloric outlet. Vomiting over a period of months had caused her to lose 60 pounds (from 165 to 105 pounds), approximately 37 per cent of body weight. Owing to the high grade pyloric obstruction, it was necessary to feed her by constant intragastric drip through an indwelling duodenal tube. The Varco formula No. 2 was used (1.6 calories per cc.) dripping 90 to 100 cc. per hour. If the pyloric obstruction is not great, the drip may be more rapid. After 20 days of preparation, an 80 per cent gastric resection was done and the patient was dismissed 16 days after operation. The photograph was taken a week after operation; the left subcostal incision can be seen. Prior to operation, the patient could neither sit up nor stand.



(B) Four months after operation. The patient has already gained more than 20 pounds.

pared by intravenous feedings. Whereas, this scheme of preparation can not compare favorably with the plan outlined above, nevertheless, it has been routine practice in this clinic to operate upon patients with complete pyloric obstruction following intravenous preparation alone. Further, it has been our practice to do the operation of election, gastric resection, upon these patients in one stage. Moreover, when patients with complete pyloric obstruction are prepared by daily intravenous administration of 2,000 to 3,000 cc. of 10 per cent glucose solutions (or preferably 1,500 to 2,000 cc. of a 20 per cent glucose solution when available), given slowly enough to insure that only a small amount of sugar is excreted in the urine, accompanied by the daily intravenous administration of at least 1 gram of amino acids per kilo of body weight, 250 to 400 cc. of plasma (depending upon the plasma protein value—also, abnormal increases of venous pressure readings attending daily infusions of plasma should be watched for) and a full complement of vitamins B₁ and C and the B complex, it has been our experience that operation is well tolerated.

THE OPERATION

In a well prepared patient, there is no need for hurrying during operation. Too many operations are still somewhat of a marathon. Operation should be made to simulate physiologic sleep. If the anesthetist will not go to sleep with his patient and if the surgeon spills only a minimal amount of blood and replaces that amount lost with an equal amount of plasma during operation, and if no item in the operation is left to chance, that is, every detail in the procedure is performed to the surgeon's complete satisfaction, why shouldn't the patient get well, barring one of the unavoidable complications enumerated above?

MULTIPLE SIMULTANEOUS ABDOMINAL PROCEDURES

The writer feels so strongly upon this subject that, over a number of years, he has held strictly to the "all or none" principle of performing whatever operative procedures are found necessary at one sitting. Multiple simultaneous intestinal resections are permissible. Gastrojejunocolic fistula is repaired regularly as a one-stage procedure, the following operative procedures being done: (1) division, inversion and closure of the duodenum, (2) three-quarter gastric resection, (3) end-to-end jejunal anastomosis, (4) end-to-side Hofmeister gastrojejunostomy (or probably more accurately described as we do it, gastroduodenostomy, 12 to 20 cm. from the divided duodenum), (5) end-to-end anastomosis in the transverse colon.

Simultaneous excision of the gallbladder, gastric resection and appendectomy apparently do not pyramid the risk over that run by the patient having gastric resection alone. When performing primary resection in the colon, I do not hesitate to excise the gallbladder or perform any other procedure that appears indicated. The surgeon should always take time to divide troublesome adhesions. How often a patient demurs a long time before accepting operation not performed under compelling indications! The patient expects that one operation will rehabilitate him. If told, after operation, that he must be reoperated upon in the near future for excision of a stone-containing gallbladder, he naturally is disappointed. If he fails to accept this advice, the persistence of symptoms disappoints him in his surgeon, no matter what the surgeon tells him. In elderly patients who do not readily submit to operation, I have found the principle of preparing the patient for one operation and doing everything necessary, sound practice. One wound heals as

rapidly as another. Whenever possible, I veer away from vertical incisions, preferring to have them run obliquely or transversely across the abdominal wall, paralleling the direction of traction from the tendinous origins of the muscles from the spine. These patients can, after formidable operations (granted a vertical incision is not employed), be gotten up a week after operation and be dismissed on the eighth day after operation. The one-stage operation suits the patient best; moreover, one period of hospitalization and one group of nurses suffice, with resulting economy of hospital beds and expense.

POSTOPERATIVE MANAGEMENT⁹

The following are important:

1. The patient's pharynx, larynx and trachea should be kept dry throughout the operative procedure and during the recovery phase. The anesthetist achieves this objective during operation by employing an indwelling tracheal tube with an inflatable cuff. Early in the recovery period, employment of the steep Trendelenburg position to aid gravitation of any retained secretions into the pharynx, from which point they may be aspirated readily by a nurse using an electric suction device, is an important item in the prevention of atelectasis and pneumonia. The importance of providing elderly patients, who have undergone a serious operation, adequate nursing care can not be over emphasized. Many things done for patients may be dispensed with as being unnecessary. Good bedside nursing in the early postoperative phase, I count as indispensable.

2. The indwelling duodenal tube after abdominal operations serves two useful functions: (a) it prevents distension by aspiration of the swallowed air; (b) it obviates vomiting into the lungs, a frequent cause of pneumonia.

3. *Overhydration* and *overchlorination* must be avoided. Elderly patients with impaired cardiac reserve do not tolerate well the administration of too much fluid. Over a number of years, in order to minimize the difficulties and the potential errors in administering sodium chloride and fluid to elderly patients undergoing major operative procedures and having suction applied to indwelling duodenal tubes (and who, in consequence, can not themselves know how much fluid or salt they need), it has been routine practice in this clinic to weigh patients once daily after operation.⁷ Our experience suggests definitely that this scheme is the most reliable method of avoiding the pitfalls of overhydration and overchlorination with resultant cardiac embarrassment.

It is frequently said that the poor cardiac reserve of the elderly patient will not permit him to withstand an arduous operative ordeal. If the patient is not decompensated at the time of operation, but becomes so during the postoperative period, my own experience suggests that we probably were responsible for the heart failure through injudicious administration of fluid. Every unnecessary gram of salt given (and not excreted) retains with it 100 cc. of water. A surgeon accustomed to prescribe 2 to 3 liters of saline solution daily for his postoperative patients may well understand how this therapeutic procedure may boomerang and become the agent which prevents him from carrying out successfully for-

midable surgical procedures on elderly patients. On my own hospital service, where we have professed an interest in this matter for a long time, I have seen elderly patients during the convalescent period being treated ineffectively simultaneously for heart failure and oliguria with digitalis and for pneumonia with sulfonamides. Call in the weighing scale and compute the gain in weight since operation! It is frequently miraculous how the oliguria of heart failure and the fever of pneumonia in the elderly patient will clear up by correcting such mismanagement. Aren't we all guilty occasionally of shortening lives when we are affecting to lengthen them and striving to make them happier?

4. Maintenance of elevation of the feet above heart level (Trendelenburg position) by use of the shock-frame during the early days of convalescence has been standard practice in this clinic for more than a dozen years. This measure combined with the expedient of enjoining constant active motion of the feet and toes during waking hours ("wiggling the toes thousands of times a day"!) are important agencies in obviating stagnation of venous blood in the leg veins. It is my feeling that this practice is an important item in preventing thrombosis and embolism. Furthermore, such active motion prepares the patient for becoming ambulant early.

5. Decubitus ulcer: A well-known textbook of surgery states: "The development of decubital ulcers is in reality a reflection on nursing care." Many other books re-echo this statement. It is high time that the onus of the "bed-sore" be lifted from the nursing profession. Whereas, wrinkled sheets and an ill-kept bed contribute to irritation of the skin, there is really only one important cause of the decubitus ulcer—*pressure!* Most frequently the "bed-sore" has its inception on the operating table. The skin over the sacrum is squeezed between two vises: that of the operating table beneath, often too thinly padded, and the patient's weight. If this tourniquet, which in fact it is, for blood flow in and out of the segment of skin over the sacrum must be as effectively prevented as if a tourniquet were applied to an extremity, is not released through some agency periodically during a long operation, the harm has been done and the skin caught between the two vises will die. Unfortunately, the death of this skin escapes notice until well into the recovery period—just in time to put the blame on the nurse! So similarly with the patient who has not been on the operating table. It is the pressure of the body weight over the skin of the sacrum that largely accounts for the decubitus ulcer. Obviously, the only effective prophylactic measure is to turn the patient frequently—an instruction which must come from the physician, and a practice that takes root in a hospital, commensurate with an appreciation of its importance.

6. Inability to void postoperatively is common occurrence in the elderly male. Fortunately, the administration of small doses of sulfonamide serves to keep the urine sterile under such conditions so that the hazard of the indwelling urethral catheter in such patients is not what it was formerly. Nevertheless, it is not entirely without risk and getting the patient up early serves to do away with the catheter. The sulfonamides have been

a great boon to the surgeon. When used in the elderly patient, however, great caution is necessary lest fixation of the specific gravity of the urine (hyposthenuria), oliguria and uremia occur.

SUMMARY

The admonition of the old testament is that: "The days of our years are threescore and ten; and if by reason of strength they be four-score years, yet is their strength labour and sorrow." The history of the life of every mature man is, in a sense, the story of the Bible: suffering, pain, a search for happiness and the better way of life, which if successful usually terminates like Lowell's story of *The Vision of Sir Launfal* and his quest in search of the Holy Grail.

The ills of the elderly patient are rarely single. He will accept operation for the relief of pain, but frequently he is inclined to regard any other operative procedure as not worth the gamble. A sympathetic examination of his problem with a suggestion as to what the future may hold for him suffices usually to persuade the elderly patient to accept a necessary operation. It is surprising how well elderly patients tolerate formidable operation when adequately prepared to withstand the ordeal. In the old, whose latitude of tolerance for abuse is small as contrasted with the young, precision technic is necessary in the operative procedure as well as in the postoperative period, particularly with reference to replacement of blood loss and the postoperative administration of fluids and electrolytes. The surgeon should propose to meet more precisely the more finely adjusted balance requirements of the elderly patient. Insofar as the surgeon is successful in meeting this objective, granted the performance of a technically and functionally satis-

factory operation, the elderly patient will tolerate formidable operative procedures at risks not far out of line from those borne by the younger, more robust individual. The experience of our clinic suggests that gastric resection may be done for ulcer at a risk of 2 to 3 per cent; for carcinoma of the stomach the risk is approximately 8 per cent, and 5 per cent for primary resection of the colon for malignancy.¹⁰ The complicationless operation spells success and is synonymous with recovery. The weekly Tuesday morning follow-up outpatient clinic has been for me a very instructive session. The renewed contacts with old patients after leaving hospital, as well as remotely after operation, has been a pleasant and a reassuring experience suggesting that the best paymaster of the surgeon is a grateful patient.

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Anesthesia for the Aging and Aged

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AN ever increasing number of aged patients are coming to the attention of the anesthetist. These patients are presenting problems which of necessity call for some insight into the field of geriatrics, if they are to be handled successfully and efficiently.

The mental attitude of old people is, on the whole, peaceful and receptive. They have passed through the period of adult prime. They have retained most of their self discipline and usually have increased their patience. They have less concern over what may happen. In general medicine this attitude may be a disadvantage as it may decrease the "fighting spirit." On the other hand, this peaceful and unconcerned approach helps the anes-

thetist to achieve a smooth and well controlled anesthesia. However, a tendency to mental confusion is common to a good many old people and adds to some of the physical difficulties of preparation for anesthesia and operation. Positioning on the table is hard for most oldsters. It is not easy for them to understand what is wanted. Above all, they cannot make their bodies relax and let others move them as desired. Arms, legs, back, and neck are apt to be held rigidly in a confused attempt to do as told. Requests that the muscles be relaxed, loosened and let go, often even increase the tension. Then, too, joints and muscles are often painful when moved. One must have utmost patience and persistence and care with old people during this rather electric time in the operating room, when all present are anxious to proceed. When general anesthesia is to be employed, it should

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usually be induced before manipulation or positioning is attempted. It is especially important to use enough pillows under the head, neck, back and knees, or wherever indicated by the conformation of the body.

The aged patient is undergoing a type of surgery which is often extensive in nature. Patients of advanced age fall into a definite disease group. These patients are more subject to malignancies, genitourinary malfunction and gastrointestinal disorders. Surgery involving any of these systems even in younger individuals is of major proportions. From this, one can readily see the increased danger to the senile patient, whose vital systems are already in varying forms of degeneration. Granting that the operation is necessary, the anesthetist must take into consideration certain facts before the patient is subjected to the added strain of an anesthetic.

The problem of premedication in these patients must be considered carefully. The aged patient will require less premedication than the more robust individual. Morphine is sometimes tolerated rather poorly by the aged. Therefore, one must be careful not to depress the vital functions of the individual to the extent that this depression becomes a hazard. Morphine depresses the respiratory system even in the robust. For this reason, smaller therapeutic doses must be prescribed for the aged. We do not wish to depress the respiratory system in the aged because such a depression will easily lead to a condition of anoxia. This condition is tolerated very poorly by the aged because the vital systems are already undergoing degeneration and the added burden of anoxia, however slight, will often cause the system so affected to fail completely. Routine premedication of the senile patient is to be condemned. Each patient must be considered individually, if sedation is to be handled correctly. Many patients in this age group are not senile and should be sedated as any other normal adult. Age is only one factor in senility. Other factors as weight, occupation, activity, muscle tone, hemoglobin, confinement, recent weight loss, and pain must be weighed before arriving at the correct premedication. Moreover, barbituric acid products should be used carefully in the aged. These products tend to depress the aged patient and to make his operative and postoperative course unsatisfactory. However, the patient should be assured of a good night's rest before operation. For this reason one of the barbiturates is usually prescribed the night before surgery. The dose of necessity is smaller than in the healthy person. It is advisable to omit the barbiturate the morning of operation. In the apprehensive patient, small doses of barbiturates may be prescribed one and one-half to two hours preoperatively. Here the individual case must be evaluated carefully. Finally, there is considerable argument for and against atropine and hyoscin. Some schools favor hyoscin and others prefer atropine. This is usually a matter of individual preference. One or the other product should always be given because of the drying effect which it produces. If hyoscin is used it is preferable to use a smaller dose than when atropine is used.

The anesthetic agent and method of administration to be used in the individual case must be chosen with care. In this regard the experience and training of the anesthetist manifests itself. Persons approaching senility have

already outlived their life expectancy and the added burden of an anesthetic agent improperly selected or improperly given may prove to be the factor causing death in the case. For the sake of simplicity the various anesthetic agents and their uses will be considered separately.

LOCAL AND REGIONAL ANESTHESIA

This form of anesthesia is perhaps the safest in the aging individual. Unfortunately, however, it cannot be used in every instance. This is especially true in abdominal surgery. Anesthesia of the abdominal wall is easily obtained by this method. After the abdomen is once opened a different situation arises. It is difficult to block successfully the sympathetic chains. For this reason, traction on the viscera causes considerable pain and discomfort to the patient. The surgeon does not have ideal working conditions because of straining and bulging of intestines into the wound. As a whole, this form of anesthesia is usually unsuccessful in abdominal surgery. However, some surgeons are able to use this form of anesthesia. Block anesthesia can be used to advantage in most other types of surgery.

Procaine and metycaine solutions are the usual local anesthetic agents. The solutions range in strength from .5 per cent for simple infiltration to 2 per cent for blocking the larger nerve trunks. Epinephrin is usually added to the solution. The vasoconstrictor action of this drug prolongs the effect of the anesthetic agent and makes its use more effective. Two drops of 1/1000 epinephrin solution per ounce are usually sufficient. Epinephrin should be omitted from the anesthetic solution when it is being administered to patients suffering from disease of the conductive system of the heart.

SPINAL ANESTHESIA

Spinal anesthesia is usually tolerated very well by the aged. This statement, however, should be qualified to some extent. The aged do not tolerate sudden changes in physiological mechanisms. For this reason, one should strive to maintain normal conditions as nearly as possible. Sudden drops in blood pressure should be prevented. This fall in blood pressure may damage an already failing cardiac system. Sudden rise in blood pressure should also be combated. This is especially true in the hypertensive individual, for an increase of pressure in such a person may lead to a cerebral accident. In spinal anesthesia one encounters a fall in blood pressure rather than a rise. This fall is usually due to blocking of the sympathetics with resulting vasodilatation. For this reason ephedrin is injected intramuscularly at the time the spinal puncture is made. The vasoconstricting action of the ephedrin will help prevent a fall in blood pressure. If the patient is a hypertensive, the vasoconstrictor should be given after the spinal needle is in place and fluid is easily aspirated. It is customary to inject 25 to 50 milligrams of ephedrin intramuscularly. If this dose will not support a falling blood pressure an additional 12½ to 25 milligrams may be given intravenously to combat the drop in pressure. Neosynephrine may also be used to combat a falling blood pressure.

If high abdominal surgery is being contemplated one may use spinal in combination with one of the suitable general anesthetic agents. By combining the two methods the height of the spinal anesthesia may be carried to the ziphoid process to pro-

duce muscular relaxation and the general anesthesia will abolish any unpleasantness arising from position on the table, traction reflexes, vomiting and psychological disturbances.

In prostatic surgery and surgery of the lower extremities, spinal is perhaps the anesthetic of choice. Here small dosage is usually sufficient, and one does not encounter the fall in blood pressure seen in higher spinal anesthesia.

Procaine, metycaine, pontocaine and nupercaine are the most popular spinal anesthetic agents. One should make sure not to use the solutions in too strong concentrations. If too great a concentration is used there is danger of injuring the nerve roots and spinal cord. For this reason, one should never use procaine and metycaine in solutions stronger than 5 per cent, 0.5 per cent pontocaine or 1:1500 nupercaine.

Procaine is perhaps the best known and, in the opinion of many authorities, the safest spinal anesthetic agent. The main disadvantage of this agent is its short action. A procaine spinal anesthetic is effective for forty-five minutes to one hour. Metycaine is somewhat longer acting. This agent will give anesthesia for one hour to one hour twenty minutes. Pontocaine is still longer acting. This agent will last one and one-half to two hours. Nupercaine is the longest acting spinal agent known. This agent will give anesthesia for three to three and one-half hours. The choice of spinal agent depends to some extent upon the length of operation contemplated.

GENERAL ANESTHESIA

A general anesthetic agent is usually administered. Here one has a wide range of choice. Numerous technics have been devised for their administration. In this class of anesthetics the anesthesiologist is perhaps of greatest value.

The careful selection of the agent to be used and its correct administration are vitally important if the operative and postoperative course of the patient are to be satisfactory. It is perhaps a greater error to administer the correct anesthetic agent poorly than it is to administer an improperly chosen anesthetic agent well.

In many operative procedures on the aged, cyclopropane is perhaps the agent of choice. This is true because the action of the gas is rapid and pleasant; a high concentration of oxygen may be maintained at all times, thus reducing the danger of anoxia; patients usually awaken readily; the postoperative period of depression is short; nausea and vomiting are reduced.

One of the main objections to cyclopropane is the cardiac irregularities one encounters, especially with the higher concentrations of the gas. These irregularities should never be allowed. If such irregularities do develop a lighter stage of anesthesia should be resorted to. Formerly it was customary to add ether to produce more relaxation if it was needed. Recently, however, a standardized product of curare (intocostrin) has been placed on the market. This product is being used extensively to obtain muscular relaxation. The patient is lightly anesthetized with cyclopropane and intocostrin is administered intravenously to produce muscular relaxation. This agent has proven highly satisfactory in the aged. By combining these two agents one reaches nearly an ideal condition. The superior qualities of cyclopropane are retained, and combined with these are the excellent relaxing properties of curare.

It has been shown that fifteen minutes of deep third plane anesthesia is as harmful to the patient as two hours of first plane anesthesia. By carrying the patient in first or second plane cyclopropane anesthesia and relying upon curare for relaxation, one can see the advantage of this combination.

Although curare is apparently safe in the hands of the experienced, its uses and abuses should be understood thoroughly. If too large a dose of the drug is given, complete respiratory paralysis will result. This paralysis is of a transient nature, and should one encounter a cessation of respiration following the administration of the drug it is only necessary to administer oxygen by pressing on the bag of the gas machine until respiration again starts. Respirations will usually start again after two or three minutes. Prostigmine intravenously has been suggested as an antidote. Fortunately we have not had to use this drug.

Ether, the old standby in the field of anesthesia, is perhaps still the safest agent in the hands of the inexperienced. This

may be only a false sense of security. While the progress of the patient may be satisfactory at the time of operation, his postoperative course is usually more stormy than that following cyclopropane. Ether predisposes to more postoperative depression. Respiratory complications, nausea and vomiting with accompanying dehydration are more common following ether.

Anesthetists are to some degree changing their opinions regarding the safety of ether. While it is still a very valuable anesthetic agent, the introduction of newer agents has to some extent replaced its use. This is especially true in very old and very young individuals. Previously, most aged patients have been given ether chiefly for the reason that the anesthesiologist realized he was dealing with a difficult problem at the start. He was therefore unwilling to use one of the newer anesthetic agents for fear he would be severely criticized should anything untoward happen. Should untoward conditions develop during or following ether anesthesia he would feel he was being protected by using the best known anesthetic agent. This trend has been changed to some extent. The newer gases are being used. Spinals are being used more extensively. So, after a period of clinical usage, it is quite evident that the aged tolerate more satisfactorily the newer anesthetic agents than the older ether anesthesia.

Nitrous oxide and ethylene are to be condemned to some extent in surgery of the aged. The chief objection to the use of these gases is the danger of anoxia. Both gases are relatively weak anesthetic agents, and the oxygen content of the gaseous mixture is often below normal metabolic requirements. For this reason these gases are not recommended.

INTRAVENOUS ANESTHESIA

This type of anesthesia has been of great benefit to the aged. Sodium pentothal in 2½ per cent concentration has proved to be the most valuable agent. Of all types of anesthesia, intravenous anesthesia has become the most popular from the patient's point of view. Induction is rapid and pleasant. There are no masks or complicated apparatus to cause undue anxiety. Usually awakening is pleasant, and postoperative nausea and vomiting are rare.

Pentothal should be used carefully in the aged. The induction should be slow. This is necessary because if pentothal is given rapidly and in too large doses there may be marked respiratory depression. Pentothal should not be used in major surgery. Its use should be confined to operations requiring little muscular relaxation and in those not over forty-five minutes to one hour in duration. This is particularly true because if large doses of pentothal are used the patient may sleep for many hours postoperatively. It is this type of postoperative depression we should strive to eliminate in the aged patient. Pentothal may be combined with a mixture of 50 per cent nitrous oxide and 50 per cent oxygen by inhalation. This mixture assures the patient adequate oxygen and at the same time provides some anesthesia from the nitrous oxide. There is considerable discussion as to the amount of pentothal which may be safely administered. There are no set rules to follow, but we are of the opinion that one should not administer more than 1 to 1½ grams to the senile patient. After this amount has been administered it is advisable to change to one of the other anesthetic agents, preferably cyclopropane.

Along with the administration of these anesthetic agents, one must consider the treatment of shock and other general care of these patients. Shock manifests itself early and in a more severe form in the aged. The judicious use of intravenous fluids, plasma, blood transfusions and oxygen and the various stimulants acting prophylactically, as well as therapeutically, will do much in preventing this complication. The prevention of or adequate treatment of this complication is frequently the keynote of success in the aged patient.

Postoperatively the continued judicious use of intravenous fluids, plasma, blood transfusions and oxygen, combined with careful nursing and medical supervision, are factors which play an important role in the recovery of this group of patients.

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Cardiovascular Deterioration

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GERONTOLOGY is one of the youngest branches of our medical sciences. Strictly speaking, it is not a science at all but a conglomeration of facts, ideas, impressions and fancies. All our sciences have had a similar beginning. The present intensive interest in this phase of medicine has been forced upon us largely by the implications to society of the increasing numbers of the old age group, and by the war. These have thrown this problem into our laps. Heretofore we have been busy primarily with diagnosis, nosology and prevention of disease. Now we enter upon another phase, a corrective phase, in which we must detect the processes that hasten old age, and encourage those that retard it.

Professor Carlson (Chicago)¹ lists the principal aging processes as follows:

1. Gradual tissue desiccation.
2. Gradual retardation of cell division, capacity of cell growth and tissue repair.
3. Gradual retardation in the rate of tissue oxidation (lowering of the B.M.R.)
4. Cellular atrophy, degeneration, increased cell pigmentation and fatty infiltration.
5. Gradual decrease in tissue elasticity and degenerative changes in the elastic connective tissue.
6. Decreased speed, strength, and endurance of skeletal neuromuscular reactions.
7. Decreased strength of skeletal muscles.
8. Progressive degeneration and atrophy of the nervous system, impaired vision, hearing, attention, memory, and mental endurance.

Of these almost all students emphasize what is termed desiccation of the tissues. In its usual application, this means a loss of water. Where does this desiccation have its beginning? In the nucleus, in the cellular protoplasm, or in the cell membrane? In one of these three areas desiccation has its inception. It has been definitely shown that intercellular fluids maintain their equilibrium in old age.² Wells³ (1933) makes out a good case for the analogy between the aging of colloids in vitro and that of colloid systems in the body.

Given a well balanced group of systems, skeletal, muscular, nervous, cardiovascular, and endocrine, the aging process goes on in an orderly fashion. Any weakness in any of the systems due to genetic influences will hasten the aging process.

Geriatrics is the branch of medicine that detects these imbalances and endeavors to correct them. Geriatrics must also be able to differentiate growth (that is the normal process of senescence) from the environmental and accidental factors (diseases of old age). Geriatrics attempts at prevention must be directed to individuals in contrast to the public health effort which is concerned with mass prevention.

THE HEART*

At birth, with the descent of the diaphragm and with the first inhalation of air in the lungs, the left heart starts on its job of pumping the blood through the systemic circulation and the right heart is relegated to its job of pumping the blood through the pulmonary system. At that moment, too, the aging process has begun, not only chronologically but physiologically.

The heart continues to grow long after the body stops growing. There are changes in the vascular supply, in the valves, in the epi- and endocardium. These changes resemble closely the changes which occur in the vessels throughout the body and are based on similar causes.

The heart is a muscle. Muscle cells, like nerve cells, do not multiply after birth. The growth then of the heart is in the size of the individual fibres. Fat is deposited around the heart particularly along the arterial grooves and auricular ventricular grooves. The valves grow more fibrous with corresponding increase in rigidity. The quality of the elastic tissue changes. There is deposition of lipoids and calcium. The left side of the heart is more involved in these changes than the right. The inner lining of the heart thickens. The tips of papillary muscles tend to thicken.

The striation of the muscle cells is more conspicuous as growth proceeds. Late in life it tends to disappear. Pigment is laid down at the poles of the nuclei. When quite marked, the term brown atrophy has been applied to this condition. In the young the nuclei are vesicular within smooth nuclear membranes. Later they increase in size, change their shape and take on more stain. The amount of elastic tissue increases and varies with age; some claim they can estimate the age of the heart in terms of the amount present. This is more evident in the auricles than in the ventricles.

The coronary arteries undergo changes. The ramus descendus anterior "matures" earliest. The changes in the ramus descendus posterior may lag behind that of the anterior five to ten years. The point of predilection for closures and thrombus formation lies 1 cm. below the origin of the anterior descending branch.

The usual view is that these changes are due to alteration in the internal elastic membranes of the intima. These membranes split early in life, while the intima constantly changes in elastic substance and ground substance until it appears wholly disorganized. At the same time cholesterol and calcium are being deposited. Further studies of the metabolism of the sterols and the function of the hormones will add to our knowledge of why these changes occur. The coronaries are subject to these changes to a far greater degree than are the radials, which are no farther developed in sclerosis at 65 than are the coronaries at 20. It is unlikely that the number

*In the comments made here I express my indebtedness to the chapter by Alfred Cohn in "Problems of Aging" (E. V. Cowdry, Editor), Williams & Williams 1942, p. 111-138. The ideas expressed fit in very well with my own experiences.

of arteries increases during life. The increased demand for blood is met by an increase in the diameter of the arteries. "At its maximum the heart muscle has increased about twenty times its weight at birth, the total area of the arteries only six or seven times. But if the square (that is, the area of the cross sections of the arteries) is raised to cube (the volume of the muscles) the correspondence in dimensions becomes clearer."⁴

PHYSIOLOGICAL

The rate of the heart-beat decreases with advancing years. At the third decade it reaches a plateau and declines during the fifth decade. The rhythm of the heart tends to be regular, but as the years advance irregularities appear. Extrasystoles and brief attacks of fibrillation may be a part of the normal aging process. The consumption of oxygen decreases with advancing years. This suggests changes in the constitution of the muscle fibres. Protein, carbohydrate and respiratory catalysts, enzymes, and coenzymes may play a part in this decrease. The functions of the nerves to the heart seem to change with age. The carotid sinus becomes more sensitive, the neuromuscular juncture less capable of being influenced. Is there less discharge or manufacture of acetylcholine or of sympathin?

Electrocardiographic changes are also observable. The PR interval tends to prolong. The QRS is widened and with it the RT interval tends to lengthen. The T1 may be inverted. The axis deviation between the left heart and the right is also changed. The voltage may decrease.

CLINICAL

The second pulmonic sound is accentuated up to the first twenty to twenty-five years of life. Does this mean the pulmonary circuit has a relative higher pressure in youth than in later years? Or is the switch over to the second aortic evidence of progressive loss of elasticity in the great vessels? As age advances a systolic murmur may appear at the apex (mitral ring dilatation), a systolic murmur may appear over the aortic area due to the thickening of the aortic ring. Willius⁵ in a study of 700 patients seventy-five to ninety-six years of age, calls attention to the various changes found in these hearts. There were 385 (55 per cent) who showed clinical evidence of cardiac disfunctions; 315 (45 per cent) who showed congestive failures; more than half of these had dominant hypertensive heart disease. One hundred seventy-two (44 per cent) gave evidence of coronary disease; of these, 124 without painful seizures, 47 with anginal syndrome and one of coronary thrombosis. Of the remainder of the group, 3 had syphilitic aortitis, and one had non-syphilitic aortic insufficiency. Let me add that in a group of persons between fifty and seventy-five years of age there would be a larger proportion of coronary diseases and enlarged hearts (hypertension). His comment is: "From the study of aged patients one gleans the impression that the majority of persons, even in the presence of evident heart disease, possess hearts of unusual quality. This impression becomes strengthened by the fact only 85 patients (12.1 per cent of the complete series) had congestive heart failure. The heart impaired or unimpaired by diseases, that permits continuation of life to and beyond the seventy-fifth year is an organ of unusual quality."

THE PERIPHERAL ARTERIES

There is a most exquisite adaptation of function in the arterial tree from the aortic ring to the arterioles. The central arteries are predominantly elastic in type. Toward the periphery in proportion to their lumen they become more muscular and under the control of the vasomotor nerves by which a definite steady flow is guaranteed to the capillaries. The sclerosing process in the elastic arteries consists mainly in the loss and rearrangement of elastic tissue with deposits of lipoids and calcium, and with dilatation and elongation (ectasia). Calcification may occur also but not as commonly as it does in the peripheral vessels. In the muscular arteries the intima thickens by a splitting up of its elastic layers—accompanied by deposits of collagen; hyaline is formed later. Fat and calcium are also collected in these areas. The media is made up mostly of smooth muscle, poor in elastic fibres. With age there is an increase of collagen fibres (medial fibrosis) with atrophy of muscle fibres. Atrophy of the media is seen in areas where there has been earlier hypertrophy of the media. "Intimal thickening apparently precedes medial atrophy."⁶ Calcification of the media (Mönckeberg's sclerosis) occurs most frequently in the lower extremities.

In the older literature characterized by the anatomical approach, attempts were made to differentiate the various kinds of scleroses: atherosclerosis, arteriosclerosis, intimal sclerosis, and medialsclerosis; clinically, hypertensive sclerosis and descrescent sclerosis were recognized. It is a descriptive terminology based on the assumption that sclerosis was a specific disease. In latter years emphasis has been placed on functions as a cause of sclerosis. If we adopt the idea that "wear and tear" is the underlying cause of sclerosis then we must accept the hypothesis that changes in the vessels are merely forms of adaptation to work—with overcompensation occurring in critical areas. If one of the functions of the walls of the vessels is to keep the endothelial lining intact then the changes in their thickness or thinness must be a response to this demand. Moschowitz⁷ defines arteriosclerosis "as a progressive and irreversible affection of the arteries in which hyperplasia of one or more structural elements is a primary reaction, with deposits of lipoids, collagenous tissue, hyaline, and calcium as a secondary reaction, the totality of both components resulting in thickening, dilatation, deformity and loss of elasticity of the walls." He emphasizes that "normal intravascular pressure is an indispensable factor in the production of sclerosis not only in the arteries but of all the components of the vascular system, including the veins, the capillaries and the chambers of the heart." He comments further that intravascular pressure is not the only agent but evidence points strongly to its being a primary one. To prove this point he calls attention to pulmonary arteriosclerosis which is always (?) due to increased pulmonary pressure. He mentions the evidence in coarctation of the aorta in which the vessels of the upper part of the body show more sclerosis than those of the lower. The secondary or conditioning factors are the chemical composition of the blood, intravascular stresses and perivascular resistance. The last two factors have to do with localization and distribution of the lesions.

The exciting monograph of Winternitz⁸ calls attention to the extensive vascular supply to the arterial walls. The text and illustrations add a new and challenging chapter to the search for the origin of sclerosis and particularly to the genesis of disease processes in the vessel walls. "It is obvious that any discussion of the morbid processes in vascular disease cannot be more than speculative in character when the knowledge concerning the blood supply to the vessel wall is in such an uncertain stage. . . . The distribution and extent of mural vascularity is a function of both age and disease. The vessels of senile individuals which show the usual general thickening but no extensive proliferative changes in the intima nevertheless may be quite vascular. The diseased vessel wall is markedly vascular at any age."⁸

THE GERIATRIC APPROACH

The most important items in assessing cardiovascular values in an older person are the extent of the arteriosclerosis and the size of the heart. The x-ray's silhouette (six foot) gives an approximation of size of the heart, it also brings out size, contour (aneurysms), elongations (ectasia) of the aorta, it shows up calcific deposits in the valves of the heart and in the walls of vessels. Palpation of peripheral vessels does not give much evidence of sclerosis unless there is calcium present (Monckeberg's sclerosis). Palpation of the radial does give an idea of tension but not of thickening. The only way by which a geriatrist can discover dysfunction in the cardiovascular tree of an older person is by objective or subjective symptoms. In the heart these symptoms are manifested by coronary insufficiency, which induces left or right ventricular failure, acute or chronic, mild or larval, nocturnal dyspneas, and angina pectoris. The dyspnea must be distinguished from that caused by emphysema, obesity and lack of tone (flabbiness). The dramatic features of coronary closure with infarction or infarction without thrombosis (irreversible anoxemia) is much more common between the ages of 45 and 65 than in the older group. The specific treatments for all these conditions are quite well known. However a word of caution is appropriate. The treatment in the old must be carried out in a much gentler fashion than of those in the earlier years. Rest in bed should not be unduly prolonged. All the resources at command must be used to evaluate the integrity or the dysfunction of the heart. Comparative records of periodic examinations including blood pressure readings, electrocardiograms, vital capacities are essential.

The circulatory disturbances in the extremities, notably the legs, are intermittent claudication and complete or partial closure of a vessel leading to gangrene. Acute closure of an artery may be due to an arteriosclerotic plaque inviting a thrombosis with complete obstruction. This must be distinguished from embolic phenomena. The treatment of the milder symptoms consists of exercise to the point of pain and postural maneuvers. Of the vasodilators, alcohol is probably the best. Tobacco is decreased or interdicted. Sitz baths at 94° for 20 to 40 minutes once a day are of value. It is questionable whether tissue extracts, hyperemia, oscillatory apparatus are of any value in the senescent type of sclerosis. The problem of gangrene is a surgical one.

Hypertension, so common in this group, is considered

as one of the accelerators of arteriosclerosis. Despite our Pages, Grollmans, Goldblatts, Bells and Scotts the mystery as to why the arterioles in one area or in all areas go into an irreversible spasm is unsolved. Later, as this spasm is sustained an anatomic barrier (arteriolar-sclerosis) is formed and fixation of the diastolic pressure is established. What should be considered the limits of normal arterial pressure is still under discussion. The insurance standards are lower than the clinical. There is a predominance of opinion, however, that the blood pressure goes up with advancing years. Willius⁷ was impressed by this in his study of 700 males. Russek⁹ in his study of 1000 males between 60 and 95 notes that there was an increase in systolic and pulse pressure with age. In his group the viability of those with systolic hypertension is practically the same as those with normal pressure. Six hundred forty-seven had systolic over 140 mm. and only 30 per cent had diastolic pressures over 90 mm. The group with diastolic hypertension had a much poorer prognosis.

Diabetes mellitus is also considered an accelerator of arteriosclerosis. "At the Mayo Clinic arterial insufficiency in the lower extremity was found eleven times more frequently in diabetics than in non-diabetics."¹⁰ Coronary sclerosis is more common in diabetics. With low fat and high carbohydrate diets the lipemia so common in the pre-insulin period has disappeared. Still the impression persists that in spite of well controlled metabolism there is increased sclerosis with this disease. With impaired arterial supply and lowered resistance to infection extreme vigilance must be practiced to avoid minor injuries to the extremities, particularly to the feet of diabetics.

The medical diseases of old age and their treatment are well known to the internists. As yet the validity of the use of diets, hormones and vitamins to modify the aging process has not been proven.

To ameliorate or retard cardiovascular deterioration the zone of attack possibly lies in the period of adolescence and maturity. In these stages, social, personal, physical and mental habits could be formed which might lessen the sclerotic processes; even modify the accelerators (hypertension and diabetes).^{*} Such changes in social, physical and mental habits would of necessity be as varied as the individual cases, and would entail periodic examinations and conferences in which psychosomatic tendencies could be corrected, the patient encouraged to live moderately, to temper work with well chosen vacations (play). The clinician must develop confidence in living and at the same time avoid instilling fear of disease.

Toward the person already in senescence our aim should be to make him as comfortable physically as possible and help him maintain as great a serenity as lies in his power.

Along this line I quote: ¹¹ "As I grow older, I have less and less sympathy with the conscientious efforts merely to extend life in old age. The curtailment of activities, the tender nursing, the humane and assiduous attention of doctors are apt, too frequently, to carry the aged tottering by the danger point, and leave them helpless doddering wrecks of humanity. Having arrived at this stage, it seems beyond their power of desire, to let

^{*}Read the report by Meyer Friedman & J. S. Kasanin, "Hypertension in Only One of Identical Twins," Arch. of Int. Med. 72:6:767.

go the one thing they possess, that shred of life that ties them uselessly to earth. The philosophy of Stevenson's 'Aes Triplex' suits me better. He says, 'We do not, properly speaking, love life, but living.' And again, 'Does not life go down with better grace, foaming in full body over a precipice, than miserably straggling to an end in sandy deltas?' It is the duty of the doctor to preserve, not only health and life, but joy of living; and if most of us had to make our choice we would take the latter. Why ward off death if in the attempt we kill living? But these, perhaps, are matters over which we have but slight control. The vigorously minded patient knows the hounds are in pursuit, and keeps up the chase in spite of our earnest protests and our pleadings to seek shelter."

Before reading the recent literature on gerontology everyone should read Stanley Hall's¹² "Senescence," published 22 years ago.

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The Radiologist Looks at Aging Bones

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UNDOUBTEDLY, many physicians have looked upon the osseous architecture of man as a static affair. The bones may be stouter structures but they are easily influenced in contour and texture by both the processes of disease and the vagaries of aging. Roentgenologic examinations serve to visualize these changes, sometimes beyond the shadow of a doubt and sometimes in spite of the seeming conclusiveness of the clinical picture.

It is almost impossible to confine this discussion to the geriatric disease in bone when one is constantly confronted with the gerontic processes of the aging person. Another factor enters the picture when the radiologist is asked to differentiate between occupational and chronological bone sequences. This becomes pertinent if we consider the numbers of industrial employees who may be seeking unemployment or workmen's compensation insurance far ahead of the present legislation of old age assistance at the age of 65.

The editorial handicap of 2500 words demands that one give only passing mention of the garden-variety of bone diseases in the aged that are part of the kindergarten of roentgenology. Let us include in this category Paget's disease, rheumatoid arthritis, metastatic carcinoma in bone from breast, kidney, prostate or thyroid which are mostly of adenomatous origin. Acromegaly and the Charcot displays in older bones are classical. Some might believe that we could dismiss tuberculosis and osteomyelitis in bones of the aged except that modern medical science has conducted these cases with so much success in the youth that now we find the remnants of these diseases providing confusing roentgen images. It is only when the radiographer becomes a radiological clinician and insists upon examining the patient and eliciting historical facts that some of this confusion disap-

pears. It is always safer to mix clinical history and other laboratory findings with the roentgen shadows if the radiologist hopes to be more than a mere chiaroscurist.

Many modern textbooks provide ample discussion and illustration of the diseases in bone found in the aged. Personally, I keep within arm's length of my viewing box, for ready reference, the following:

- Diagnostic Roentgenology*, Thomas Nelson & Sons. Edited by Ross Golden, M.D. Citing especially chapter VI by Paul Hodges, Dallas Phemister and Alexander Brunschwig, which can be obtained as a separate book.
- Roentgenology*, by Alban Kohler. Translated from Fifth German Edition by Arthur Turnbull. William Wood & Co., New York.
- The Radiology of Bones and Joints*, by James Brailsford. William Wood & Co.
- Neoplastic Diseases*, by James Ewing. W. B. Saunders & Co., Philadelphia.
- Tumors of Bone*, by Charles E. Geschickter and Murray M. Copeland. Published by the American Journal of Cancer, New York.
- The Arthropathies*. Handbook of Roentgen Diagnosis by Colonel Alfred de Lorimier. Yearbook Publishers, Inc., Chicago.

It would be folly to hope that anyone could add anything to the above texts. From now on this humble(?) radiologist indulges in whimsical items of geriatric interest. If you are a classic reactionary clinician, stop here. If you are imaginative, read on.

Let us indulge ourselves first in bones which show productive changes in contour having their origin in occupational and chronological osteoarthritis. Inasmuch as backache, arthritis, low back pain, lumbago, protruded discs, sciatica, metastatic carcinoma and the Charcot spine are more frequently found in the lumbar spine, we can easily study these conditions upon x-ray films made with a Potter-Bucky diaphragm. In looking over books by Boas and Thewlis, I find they constantly refer to the

traumatic origin of osteoarthritis. I question this because some of the major displays or chronologic changes in bone occur in the lumbar spine or in the portions of the spine that are far away from any direct trauma.

Again, one who has had a great deal of x-ray experience finds that there are probably more spines with desperate osteoarthrosis and no symptoms. Yet we find our physician constantly implicating the x-ray shadows as the origin of symptoms. I have followed the career of a number of friends whose spines I filmed years ago and found desperate deforming osteoarthrosis of the spine. Being professional men, they never sustained injuries which caused them to seek green-back poultices for relief.

Just as we are able to compare anatomic vs. chronologic age in the children by roentgen studies of the carpal bones, so are we able to judge occupational changes and chronologic sequences in the lumbar spine of the aging individual. With the increasing millions of our citizens who will be aging under medical care via Veterans Facilities and all of whom are potential candidates for pensions, there is bound to be the necessity of differentiation among the above origins of pain in the back. If there is just one candidate for veteran hospitalization or pension who does not include low back pain among his symptoms let us award him the Sacred Lilac Decoration!

The roentgen film of the lumbar spine in the aging person affords so many variations, anomalies, textural vagaries, anatomical defects, chronologic crystallization of lines of force, protective spur formation and bridgings, that it requires a stalwart and courageous radiologist to resist the clinician's insistence that any visible variation from the textbook spine produces the symptoms.

Not only will we be confronted with increasing millions of veterans but we are now confounded with that large grouping of industrial workmen who have a pain in the back (that gives the doctor a pain in the neck) far ahead of what is generally conceded as old age. These workmen, including farmers and laborers, are aging frequently at 50 and yet old age is not legislatively established until 65. Did I forget to mention that after World War I, we had to provide medical care and hospitalization for four million veterans? After World War II, we will have to provide similar accommodations for ten million men plus their wives, children and dependents. I can see them now—lined up for miles—and as they approach the disability board they will all have their hands upon their stooping backs like an advertisement for kidney pills.

The roentgen examination of the spine has gradually eliminated the old-fashioned railroad spine. Next we had the sacroiliac luxations; then traumatic osteoarthritis. This gave way to the protruded disc, which is now rampant. The future may provide the rubbery, social security spine, both male and female!

OSTEOARTHRISIS OF THE SPINE

Chronic, progressive osteoarthrosis, which principally is found in the lumbar spine, although the dorsal and cervical do not escape involvement, has masqueraded as an osteoarthritis for so long that this title may never be eradicated. It is not an infectious nor inflammatory disease, therefore the ultima, itis, is unjustified and mis-

leading. An infectious spondylitis, such as rheumatoid arthritis, or spondylitis rhizomelic, can occur. But the gradual development of osteophytes, spurs, bridgings and marginal condensations of calcium content that adorn the aging spine are rarely if ever of an infectious origin that produces actual inflammation. The term osteoarthritis should be reserved for definite inflammatory disease, and the term osteoarthrosis adopted. The terminal, osis, means a condition or process.

That is exactly what spinal osteoarthrosis is—a condition or process at and about the vertebral bodies that provides minimal to gross changes from the textbook spinal osteology. These changes are not essentially pathological. They are never caused by a single trauma. They are not due to focal infection, although one might grant an osteoarthrosis complicated by a rheumatoid arthritis.

ARBUTHNOT LANE'S STUDIES OF OCCUPATIONAL BONE CHANGES

Quite by accident I stumbled upon Lane's dissections of skeletons of laboring men and women, which he did before the advent of the x-ray in 1885 to 1890. These original articles were buried in English anatomical and pathological journals. They were exposed later in books by Lane entitled:

Operative Treatment of Fractures, W. Arbuthnot Lane. Medical Publishing Co., Ltd., 1905.

The Operative Treatment of Fractures, Lane. Medical Publishing Co., Ltd., 1914.

The Operative Treatment of Chronic Intestinal Stasis, W. Arbuthnot Lane. James Nisbet & Co., London, 1915.

Lane was apparently the first to indicate that "the skeleton is best regarded as the crystallization of lines of force." This has always intrigued me because it seems fundamental to assume that bones change form and texture from stress and strain, occupational insults, both accidental and continuous, including postural demands. Bones change form and texture in order to adapt themselves to shifts in weight-bearing or muscular strain. Witness the extraordinary size of the deltoid tubercle in the man with the hammer or mallet. The thumb of the old shoemaker, who pulled the waxed thread through the awl holes, became a mighty structure with eburnations of the joint margins and elongated talons of bone at the tendinous attachments.

Lane shows how the lumbosacral articulation developed a forward spondylolisthesis in the laborer lifting heavy loads from the floor but there was a reverse backward spondylolisthesis at this same joint in porters carrying loads upon the belly. Modern machinery and devices have eliminated many of these jobs that taxed the skeleton. But those who labor hard today still show new bone formations, bridgings and spurs about the lumbar spine even if they only stand at machines or lean upon a WPA shovel. The lumbar spine is the single structure of density between the supporting pelvis and the heavy torso above.

Such osteoarthrotic formations do fortify the lumbar spine and they are really crystallizations of lines of force. They are the result of the demand for a better supporting structure between the pelvis and the heavy torso. The timid little old maid at the sewing machine does not develop osteoarthropathy, but the farmer, the laborer,

even the athlete, may. Any occupation or recreation that puts stress and strain upon the lumbar spine in either sex finds a gradually increasing roentgen display of spinal osteoarthritis.

This preceding lengthy discussion seems necessary to support my contention that so-called osteoarthritis of the lumbosacral spine (which I prefer to call an osteoarthritis) is a matter of chronologic osseous defense. The occupation of the individual can hasten or increase these crystallizations of lines of force. They start in middle life. They are progressive. They are permanent. They do not recede or reabsorb in later life. Inactivity makes them more of a static affair. But they must not be regarded as a disease of the spine and they are not of infectious origin, nor do they provide actual inflammatory changes.

There are typical bone changes incident to many occupations or recreations. Some of these may be upon skeletal bones such as the printer's thumb, the shoemaker's thumb, the laborer's spine. The aged may show the relics or remnants of myositis ossificans, such as the rider's bone in the adductor longus, the football player's long bone in the quadriceps, the dancer's bone in the soleus muscle and the fencer's or tennis player's bone in the brachialis. Slivers of bone have been reported in the rectus muscle, postoperatively by Hodges. Many interesting but innocent bone formations are found in older people by the roentgen method about joints that sustained a forgotten injury. These, and the distortions of the femoral head from an unrecognized Perthes disease, serve to complicate the estimates of disability in injuries of older people or in veterans before disability boards. The *Res Ipse Loquitur* legal logic must not be applied to the roentgen exhibits in older people indiscriminately.

HALISTERESIS. OSTEOPOROSIS. PARATHYROID DECALCIFICATION

Bone atrophy in older people is almost an omnipresent condition. No particular attention seems required here for the atrophies in bone due to injury, to disuse or as an incident to many typical diseases with characteristic bone pictures, such as myeloma, carcinoma, paraplegia, hemiplegia, etc.

Skeletal decalcification and osteitis fibrosa cystica may have parathyroid tumors as a causative factor. The production of parathyroid decalcification in laboratory animals by the administration of parathormone and its relief of tetany produced by parathyroidectomy provides ample laboratory background. The roentgen picture of parathyroid decalcification is one of washed-out bones upon a film, lacking contrast, with the margins of the bones seemingly intensified. First, there is the overall bone atrophy and then osteoporosis appears. Vertebral bodies seem squeezed and they seem to lose height without any widening. The discs are not disturbed. The osteoporosis seems to take on the character of cysts, hence osteitis fibrosa cystica. Boyd gives excellent descriptions in all his later editions upon *Surgical Pathology and Pathology of Internal Diseases*, to which the student is respectfully referred.

Personally, I am surprised that we do not encounter more of this disease in the populations of the Veteran's

Hospitals, Insane Asylums, etc. It must be differentiated from myeloma in bone, osteomalacia and metastatic carcinoma from some known or unknown tumor. Boyd describes the typical case as developing in late childhood but the several I have seen are in people over 60. Forced calcium therapy has availed little. I have felt that the administration of thyroid extract might assist in the mobilization of the calcium in the decalcified bones. Undoubtedly, we shall be hearing more about this condition of which our knowledge starts as of 1925.

METASTATIC CARCINOMA IN BONE

Aside from the classical displays of metastatic carcinoma in bone which is usually of the adenomatous origin, we must mention two interesting recent items.

It is a matter of but a few years ago that Huggins established the usefulness of the synthetic female hormone, diethylstilbestrol, in patients suffering with the bone metastases of prostatic cancer. There have been many supporting articles with reliable clinical testimony. It is not curative but it does relieve pain and thus the patient avoids narcotics and prolonged series of roentgen therapy. Already we find articles criticizing this new treatment. It is my thought, however, that until some better treatment is found, the use of diethylstilbestrol coupled with the castration of the subject is justified. Both the therapy and the operation are comparatively harmless. They are never offered as curative therapy. The benefits may depend upon the castration more than the female hormone when one considers the next item.

EFFECT OF CASTRATION UPON METASTATIC BONE CARCINOMA IN THE MALE

Farrow (*Science*, 1942) made a preliminary report upon the recession of metastatic bone displays in a male patient with a cancer of the breast from the simple procedure of castration. No roentgen therapy was applied. The patient has lived comfortably since and the bone displays have definitely receded or disappeared in ribs, scapula, etc. Castration of the female can be accomplished by the roentgen method as well as by an ovariectomy. The male cannot be castrated by x-ray. He can be sterilized but not castrated. Portman (Crile Clinic, Cleveland) writes the following: "Irradiation in therapeutic doses will destroy the germinal epithelium of the testes but not the interstitial cells which secrete the testicular hormones. It is necessary to destroy, or at least suppress, the hormones to get the benefits in carcinoma of the prostate. Therefore, the best procedure is orchidectomy. It is quite different in the female because irradiation stops the production of ovarian hormones by destroying the Graafian follicles and the corpus lutea."

The use of the opposite sex hormone for metastatic carcinoma has found isolated supported and conflicting experimental studies. Testosterone has been administered to the female with breast metastases. Large doses are necessary if any good at all is obtained. I asked one enthusiast about his dosage. He replied that he gave it until the woman grew hair on the upper lip and developed a bass voice.

Mental Disorders of Old Age*

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Introduction

INCREASE in the life span has brought about not only new social and economic problems but has added responsibility to medicine in general and to psychiatry in particular. Increases in the admission of patients in the older age groups to mental hospitals during the past two decades illustrate the magnitude of the psychiatric problem. Dayton's¹ recent book on the statistics of mental disease emphasizes the fact that mental disease is a disease of old age, and that the devastating psychosis of early life, dementia praecox, long thought to be the most frequent cause of mental breakdown, actually is far outrun by the psychoses of the advanced years. Adding the admission rates of senile psychosis with cerebral arteriosclerosis, the total of 2,215 per 100,000 of our population within the old age categories compares very unfavorably with the total of 538 per 100,000 of our population within the younger age categories, the incidence of schizophrenia. Study of the medical problems of the aged has been thought until recently to be therapeutically unpromising. This was particularly true of the psychiatric aspects since senile and arteriosclerotic and other old age mental illnesses were thought to be hopelessly irreversible. Recent psychiatric publications, however, have shown this not to be the case. In a recent paper by the author² it is reported that of 123 cases diagnosed after adequate study and legally committed to a mental hospital nearly 25 per cent recovered and returned to their former occupations or to their homes, having achieved "social recoveries." Another³ analyzed 100 patients diagnosed psychosis with cerebral arteriosclerosis and showed that under adequate therapy 49 per cent were able to return home classified "recovered", "much improved" or "improved". The acute confusional states occurring in old age have a remarkably good prognosis when treated by modern methods⁴ based on full knowledge of the physiological deficiencies, toxemias and other reversible pathology in people of advanced years. There is much additional evidence tending to disprove the long standing prognostic pessimism.

There are now in the United States nearly 9,000,000 persons over 65 years of age and the statisticians tell us that in another 40 years this number will reach the impressive figure of 22,000,000. Taking into account improved hygiene, the exercise of special preventive measures and other improvements in therapy the predicted burden is anything but encouraging. Kolb⁵ points out that the high incidence of old age mental breakdowns may increase approximately 200 per cent unless preventive measures are successful. In a statistical accounting by the author approximately 24 per cent of all patients admitted to mental hospitals were suffering from the psychoses of old age. Not only is the old age group adding

gradually increasing burdens to medicine, to social agencies having to do with their care but they also are becoming an increasingly important political force. The time may be approaching when a sufficient number of persons in the older age groups will unite to form one of the dominant political forces in our democratic nation.

The two major problems in the mental disorders of old age are *senile dementia* and *psychosis with cerebral arteriosclerosis*. The majority of cases with *involutional melancholia* occurs in later life but the disorder can make its appearance before the age of 40. In the strict sense involutional melancholia cannot be called a "mental disorder of old age" and yet it may be well to sketch briefly its cardinal features, since there still persists, even in the minds of medical men, a great deal of misinformation regarding its etiology, its prodromal symptomatology and the psychotic syndrome. Alzheimer's disease is found with relative infrequency in psychiatry and is a rarity in general medical practice, so that little time or space will be given to it. Pick's disease, an even rarer type of degenerative mental disorder, can be spared only brief mention. Parkinson's syndrome, brain tumor, drug intoxications (especially bromide), the so-called infectious-exhaustive psychoses, syphilis and alcoholic mental deterioration all occur in the old age as well as in other age groups and, when encountered in the aged, require special diagnostic and therapeutic skill. Time and space do not permit any detailed discussion of these disorders.

One must keep in mind the fact that the personality structure and mental integrity of persons of advanced age are particularly vulnerable to the effects of toxins and the fevers of infectious disease. The mental confusion, disorientation, memory defects and unstable emotionalism following closely upon physical illness, however, must not be too hastily diagnosed as progressive senile deterioration. Diseases which affect particularly the circulatory efficiency in the brain are capable of producing alarming transient acute mental symptoms or more or less long drawn out confused mental states which recover only with the reestablishment of circulatory adequacy. The mental symptoms, almost classical in early senility, have their prototypes in old age in fatigue states, marked secondary anemia, long standing nutritional deficiencies and congestive heart failure.

THE PSYCHOLOGICAL CHANGES DUE TO AGE, TEMPERAMENTAL AND PERSONALITY CHANGES

Various points of view are often at odds with regard to the psychological changes with ages. It is sometimes stated that the older man is too "set in his ways," uncomprehending, shows a decrease of adaptability, is difficult to teach new technics and has a lack of flexibility. Other points of view value the older man of experience, his judgment and skill above the more unreliable younger employee.

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In discussing temperamental alterations it would be wise for us at this point to call attention to the fact that there is no classical picture of naturally occurring mental deterioration. Where such symptoms as deeply ingrained mental rigidity, inability to accept new ideas, cantankerous irritability and strong biases and prejudices exist in the man or woman over 60 they are probably only continuations of life-long traits visible throughout the adult years. Only occasionally do these idiosyncracies of age mark the decline into mental illness. It must be remembered that while the incidence of old age mental breakdown is high the incidence of mental normality among old age groups is, of course, enormously higher. It must also be stressed that many of the psychological traits accepted as occurring *sui generis* are really reactions to unsympathetic and defeatist attitudes displayed by others against the older age groups. Another psychological factor too seldom taken into account is the retirement crisis. Industrial workers, especially, have this threat hanging over their heads throughout their later years. The worker rarely looks forward to his retirement with the pleasurable anticipation he should because it too often represents to him the end of his usefulness and productivity. He has, in addition, the fear of loneliness and in many instances has made no preparation for the use of leisure. Some efforts are being made to insure gradual retirement, to give some instruction in the use of leisure and more attention is given to the utilization of the retired worker in skills and crafts allied to his former work but having no fixed hours, lacking the pressure of industrial production and in other ways fitted to his slowly declining physical energies, yet repaying in terms of emotional satisfaction.

In general, however, there are certain undeniable alterations in the personality and in the outlook of persons as they grow old. There is some narrowing of the mental horizon, some restriction of interest partially due to waning mental and physical energies. "Keeping up" with things can, as any practitioner of medicine will testify, take a good deal of mental energy. Some of what has been called the "natural deterioration" of aging may be due to the bad habit of focussing interest solely upon occupation to the exclusion of those interests and hobbies which are the future resources of the elderly man or woman. There often occurs an unfavorable "frame of mind" in persons past 60 in which they become mentally obsessed with the idea of growing old. How often we have heard our associates and colleagues say, "Well—I'm getting on in years," or, "You know I'm getting to be an old man." There is some likelihood that this "complex" of old age is created by the individual as a sort of protection against the admission of incompetence or of his gradually failing resources. The worry and fretfulness often visible in the elderly may also represent reactions and resentments against the handicaps, defeats and frustrations of life.

INTELLECTUAL ALTERATIONS

Intellectual ability begins to decline not after the age of 60, but after the age of 25, and falls off progressively with each succeeding decade. By certain tests combining both verbal and non-verbal material it has been shown by

Wechsler⁶ that intellectual ability diminishes in a long, even slope after age 25. The loss from age 25 to age 60 is on the average approximately 25 per cent. These intellectual changes parallel quite accurately the changes in physical capacity. In general it has been found by testing that verbal abilities hold up much better than non-verbal ones. Many individual factors must be taken into account in such generalizations since such data apply only in a statistical sense. For example, a lawyer may have accumulated at 60 a vast experience in specialized legal practice and may continue after that age to increase his special knowledge and talent. We have the examples of the brilliant jurists of 80 and more whose store of usable intelligence grew materially after 60 and whose opinions, based on that vast accumulated knowledge, were brilliant demonstrations of the application of that knowledge. Memory function is also shown by test to decline but vocabulary and linguistic function are less or not at all affected.

PSYCHOLOGICAL DYNAMICS INVOLVED

The dynamics of the process are undoubtedly a combination of a large somatic factor and an equally large psychological one. The psychic stresses have many components; economic dependency, a large social factor in loss of significant place in this fast moving world, the feeling of being no longer wanted or needed, the loss of the supporting strength represented by husband or wife, or life-long friends, the loss of interest by the world in general for the person who is inactivated by age. Nor are the exogenous forces the only important ones. There are intrinsic dangers in the threat of failing physical resources, and perhaps most significant, there is the ever present, life-long threat of loss of personal security or adequacy of self. The gradual failure of the older person's ability to deny vulnerability of self brings about alarm and fear. Or, there may be in evidence all of the signs of rebellion against the acceptance of the dependence produced by infirmities of old age. After having achieved independence it is not an easy thing to find one's self forced by age into a role of dependence. After once having been dominant in the home and immediate environment, the rebellion and resentment against the passivity and social and economic impotence of old age is understandable. The older person looks also vainly for the veneration and deference which, in this age, is not forthcoming. Solicitous care and respect for the old men of the tribe are not characteristics of our civilized culture. We observe in the psychotic stages of senile and arteriosclerotic mental failures the projection of the feeling of one's own disintegration into the environment as paranoid delusions, threats of bodily harm from forces outside the self, delusions of being tortured, murdered, dismembered, etc. We also see in the non-psychotic, as well as in the psychotic stages, a compensatory self-inflation, a protective failure-denying grandiosity, a rich and often silly confabulatory and pseudo-reminiscent bolstering up of the ego against the onrush of the realization of vulnerability and defeat. Preceding this, and perhaps to some extent serving as a motivation for some of the symptomatology, is the realization of failing capacity for more realistic compensatory readjustments. In the longitudinal

sense all of the mental processes can be looked upon as having their roots in the life-long personality of the patient. Having closely examined the symptomatology and having in mind its possible continuity with prepsychotic personality traits, trends reaching back into the individual's basic psychic traits will be revealed. The symptoms seem like caricatures and enlargements of the former hidden or controlled strivings and compensations for inferiorities. Psychogenic influences in senescence are made up of the force and finality of the threats to personal security inherent in the disruption of economic, social, physical, physiological and mental orientation and in the convergence of these disintegrating forces upon the person of advancing years.

Prodromal Symptoms

SENILE PSYCHOSIS (Dementia)

The onset of senile dementia is characteristically a gradual process beginning with an almost insidious weakening of initiative, loss of interest in things normally of vital importance in the person's life, alteration of sleep habits, obvious impairment of memory, comprehension and responsiveness. In the earliest stages, of course, the fine line of distinction between the normal changes of age and the earliest beginnings of the prodromes of psychosis is difficult to draw. These changes occurring in moderation may have no special import. In a study of the prodromal symptomatology of somewhat over 100 cases of senile psychoses the chief early reactions could be traced through three definite stages: (1) a neurasthenic-like symptomatology, (2) gross exaggeration of life-long character traits, biases, prejudices, (3) the appearance of frank memory defects, states of confusion and delusions.

In the majority of our cases a neurasthenia-like syndrome characterized by complaints of weakness, malaise, insomnia and nervousness had existed for six months to one year prior to the mental breakdown. Irritability was a common symptom noted by relatives. General practitioners usually saw the earliest manifestations, and frequently these appeared in the convalescence from minor illnesses, such as colds, grippe, "flu", etc., which were followed not only by the mental confusion and unstable emotionalism frequently ensuing on the physical illness, but also by what seemed to be a permanent change in the personality structure. In many instances patients suddenly exhibited traits foreign to their earlier personalities, or showed marked increase of certain minor character defects which during a long life had remained submerged. Henderson and Gillespie state that "there is not so much a change of personality as a caricature of it." Thus a life-long trait of saving and caution in financial matters may become exaggerated to the point of miserly hoarding of useless scraps and trinkets and extreme penuriousness. A mild distrust of others and hypersensitiveness may develop into troublesome suspiciousness, delusions of persecution with threat of retaliation, or actual resort to legal prosecution. Old, buried ill-feeling and grudges may become ignited and inflame the patient to attempts to do bodily harm, or to make ill-advised complaints to neighbors, friends or the police. Inhibitory control may be seriously diminished, and formerly repressed asocial or anti-social tendencies permitted to obtrude.

Transient sexual interest may lead to impropriety of conduct. Normal sympathy and regard for the feelings and opinions of others are often lacking, and extreme emotional lability with undue sentimentality and lavish, injudicious charities may occur. It is in this prodromal stage that patients become liable to contract sudden, unsuitable marriages, or to execute a succession of new wills, which may be increasingly unnatural and subject to contest in court.

Serious memory defects are frequently an early sign of senile change, and are possible sources of danger to both the patient and his family. The patient may wander away and become lost or injured; he may turn on a gas burner and forget to light it, or a water faucet and forget to turn it off, or carelessly put down a lighted match. Such patients sometimes throw money into waste baskets or the fire. Insomnia of abnormal severity and inconsiderate and noisy nocturnal restlessness may indicate the onset of mental failure.

Following the prodromal stage, senile dementia takes the form of gradual mental disintegration without characteristic acute neurological symptoms. A typical account of the prodromal symptomatology from our records of a case of senile dementia is as follows:

A well-to-do business man, 72 years of age, was committed to the hospital because of troublesome mental symptoms involving danger to himself and others. He was always considered a "lone wolf" in both his professional and social life. He often boasted that he made his money by minding his own business and expressed the desire for other people to keep their noses out of his affairs. For one year before admission his business associates had been urging him to retire because of his ill health. He had suffered repeated attacks of grippe and "flu" and had a good deal of discomfort in his joints and back—diagnosed as chronic arthritis. In his business relationships he had become increasingly overbearing and cantankerous. He was convinced that the country was going bankrupt and that the people should take their money out of the banks and bury it. He very nearly caused a "run" on his own bank by this constant expression of pessimism. He became excessively friendly with one of the female employees of the bank, a Christian Scientist, and under her guidance took Christian Science treatment for his arthritis but experienced no benefit. Unknown to his associates at the bank he had all of his own securities removed from the vault and entrusted them to this young woman, who kept them in boxes hidden in her attic. He repeatedly ordered the dismissal of old and trusted employees of the bank and gradually developed the idea that these persons were "planted" in the bank by the F.B.I. in order to "get something on him." Dietary peculiarities, a life-long trait, became exaggerated into a delusion that his food was poisoned and his woman confidant tasted all food before he ate it. Nocturnal restlessness resulted in inadequate sleep and gradually he became more worried and suspicious, watching out of the windows for his enemies who he thought were going to rob him. He called the police on several occasions in the early morning hours because he thought he saw men creeping through the shrubbery. He regarded his mem-

ory as phenomenally good even though he continually "lost" his spectacles, his fountain pen, check books, etc. He blamed their disappearance on "enemies".

PSYCHOSIS WITH CEREBRAL ARTERIOSCLEROSIS

The prodromal stages of psychosis with cerebral arteriosclerosis may resemble, to some degree, those characteristics of senile dementia but in the majority of instances the symptoms of organic neurological involvement predominate. The commonest symptoms are an apoplectiform seizure of major or minor character, and the development of characteristic mental changes dating from this seizure. These subsequent mental symptoms may develop acutely or may be, in the earliest stages, little more than an awareness on the part of the patient that he tires more quickly, that sustained mental effort is impossible and that initiative, self-assurance and powers of comprehension are diminished. Memory defects, emotional instability and outbursts of unreasonable anger are increased. Such aggravated mental symptoms appear as a rule in conjunction with tremors of the hands and face, confused thick speech, head noises, vertigo, generalized weakness and unsteady gait. A typical account of the prodromal symptomatology is to be found in the following account of the onset of psychosis with cerebral arteriosclerosis in a woman of 67.

The patient was widowed at age 37 and, being financially of slender means, became a dressmaker. She had had one child, a girl, who died in infancy. As she grew older she became increasingly weighed down with her misfortunes and began to display cynicism and bitterness. She withdrew from her few friends and lived almost in seclusion, doing what work was brought in to her and rarely going out. She communicated with her landlady by pinning little notes on her door and complained constantly about other "roomers." She was finally asked to leave when she was 62 years of age, having lived in the same rooms for 21 years. At 65 she visited the Out Patient Department of the hospital, complaining of headaches, attacks of vertigo and tinnitus. Blood pressure was found to be 178/116 and the peripheral vessels were moderately sclerotic. Memory was moderately impaired and she was unable to remember the names of her clients or the address or name of her former landlady. Two years later she was again seen in the clinic (age 67), one month after having been picked up on the street in an unconscious condition and taken to a hospital where the diagnosis of a "transient stroke" was made. She had been discharged after regaining the use of her left arm and leg. Following this cerebral vascular lesion, however, she did not fully recover her mental powers and was confused, irritable, sullen and suspicious. She threatened to "have arrests made" but refused to name, or could not name, the persons who were involved. She was unable to work and lived on assistance from social agencies. The social agency reported that her room was slovenly, her personal clothing unkempt and her eating habits extremely capricious. She refused to enter a home for the aged or to go to a mental hospital. At 67 she was brought to the hospital by the police because neighbors had complained and had finally had her arrested for threatened violence and disturbing the peace. Blood pres-

sure on admission was 180/128, nutritional state was poor and there was marked weakness of the right arm and hand and the right side of the face. The right Babinski was positive. She complained that her neighbors were operating an electric machine as part of a plot to drive her crazy by keeping her awake at night. She stated that she was the only person who could hear this machine because it was instantly shut off when another person listened. She stated that the neighbors were insane and were determined to injure her. She frequently screamed "Fire!" from the windows of her home, and pounded on the wall to attract the attention of the police so that they might arrest the plotting neighbors. In this way she made a disturbance through the night into the early morning hours. She had frequent spells of arteriosclerotic vertigo and had fallen a number of times. In the hospital she was confused and garrulous and still terrified of her neighbors, who she said had brought about her commitment by a "frame-up". She gave dramatic imitations of their actions, and was agitated and suspicious, with periods of excitement and profound confusion. She developed paranoid delusions of persecution about persons in the hospital.

INVOLUTIONAL MELANCHOLIA

Involutional melancholia is a grave mental illness and it is essential that we make a distinction between it and the "menopausal syndrome." Symptoms common to the menopause include a wide range of physiological and functional manifestations together with certain psychological reactions which are almost necessary accompaniments of conscious realization of the onset of the process of involution. It is stated by various authorities that only about 15 per cent of all women have "some difficulty" during the menopause and that the symptoms are of either nervous or vasomotor types in addition to the usual irregularity and cessation of periods. It is generally acknowledged by psychiatrists that a very small fraction of women who have menopausal disturbances of one kind or another actually develop the mental illness of involutional melancholia. Study of the literature relative to endocrine therapy during the involutional period leads us to believe that serious errors are made in reporting optimistically on certain supposedly specific therapies for involutional melancholia. In reality, the entity described in some of these papers as involutional melancholia is simply a combination of minor nervous instabilities, dyspnea, hot flushes, nervous tension, vertigo, headaches, sweats, paresthesias and the vague neurasthenic manifestations which often accompany the change of life. That these manifestations are of benign character and rarely lead into involutional melancholia is demonstrated by the fact that such a small percentage of women (treated or untreated by endocrine therapy) develop the involutional melancholia psychosis. We propose to limit the term *involutional melancholia* to the actual mental disease as it is known in psychiatric nomenclature, and as defined and elucidated in various authoritative psychiatric texts. Our studies have shown that patients developing involutional melancholia suffer a breakdown in this era because of the culmination of many forces. The endocrine imbalance is not

the primary factor and perhaps not always a significant one in the development of the mental disorder.

If the fact of menopause, together with its disruption of endocrine balance, is only one of the contributory factors, it is essential that we present evidence of other factors which comprise at least a portion of the total threat to the mental equilibrium of the involuntional person. These forces, which we believe to be of far greater significance in the etiology of the disorder than the physiological maladjustments, have to do with the unique features of the prepsychotic personality. A careful inspection of the early history of the patient with involuntional melancholia shows that from childhood or puberty he has been an unusually guarded introvert, not even allowing himself the fantasied outlets of the freer, more harmoniously adjusted introvert. The person with potential involuntional melancholia has generally imposed a heavy burden on himself in the form of numerous restrictions on his instinctual life, has avoided pleasure to the point of fanaticism and has set up for himself a stern, unbending moral code, which no ordinary mortal could hope to satisfy. Pathologically inhibited, scrupulously meticulous about trifles, chronically worrisome, either justifiably or not, unable to free his affective forces for the uses of normally warm human relationships, he has guided his life firmly into a narrow, affectless road which could, at best, only stifle the free play of personality. Rigidity is generally found to be of such pronounced degree that it not only shows itself in the psychic attitudes of the patient but is even transferred to the soma in the form of pathologic tensions and hypochondriacal disturbances of sensation. The psychotic phase is the culmination of a life-long psychobiologic process of a distinct character; the pathologic markings are unique at each stage of the process. The outstanding characteristic (rigidity) of the personality drives of the person into pathologic reaction formations at various stages of his career and prepares the way for the development of psychosis at the crucial era of transition into the late middle years.

Not only do the limitations of the personality foster the development of involuntional melancholia at the time of the climacteric but, in a real sense, the degree of limitation of the personality determines the prognosis after the onset of the psychotic stage. The relation of personality type to prognosis is a definite one. All of those patients in our study⁷ who failed to recover showed marked restriction of the mental horizon throughout life and the majority showed classic "obsessional character." Only a few of those who recovered showed obsessive traits. Since involuntional melancholia represents one phase in the development of a life-long biologic process, one is justified in drawing prognostic conclusions from an evaluation of the fixity of this biologic process in the prepsychotic stages.

It seems especially necessary to stress the importance of the earliest recognition of impending breakdown. The development of persistent hypochondriacal trends is a warning sign. There is preoccupation with physical discomforts, strange sensation, "unnatural feelings," pressure in the head, tight sensations about the head, interference with the functions of special sense organs, with-

drawal of sex interest, genital sensations or feelings of sexual "deadness." The patient gradually becomes more withdrawing, constricting his social life even more rigorously than heretofore.

Restlessness becomes a part of the picture and irritability, impulsive anger and suspicious trends are not uncommon. Interest is withdrawn from external objects and egoism is heightened. Satisfaction in life disappears and contemplation of decline and death is substituted. Certain physical changes are in evidence; increased pulse rate, rise of blood pressure ("menopausal hypertension"), indigestion, anorexia, constipation and weight loss. The picture becomes increasingly severe and as it gains momentum the outstanding features are irritability, heightened intolerance, compulsions, insomnia, anxious depressions, restless pacing. Finally there are added the characteristic feelings of insecurity, complete inadequacy, fear of the future and of impending dissolution.

The Psychotic Stages

Since an understanding of the prodromal symptoms of mental disorders of late life is the key to proper therapy very little space will be given to a discussion of the symptoms of well established mental breakdown. Textbooks on psychiatry and the sections on nervous and mental disease in standard medical systems and texts contain adequate presentations of the psychotic stages. Outline form is the most compact way of presenting the material. The abnormalities in the categories of emotional reaction, ideation and action will be briefly stated.

SENILE PSYCHOSIS

Onset is gradual, as noted in preceding paragraphs on prodromal symptoms. These are, of course, associated with numerous signs of physical disintegration.

Emotion: Irritability, cantankerousness, apathy, occasionally depression, often silliness, suspicion and obstinacy.

Ideation: Confusion, disorientation, especially in temporal sphere, stubborn adherence to fixed ideas, failure of memory, especially for recent events, mind often occupied with reminiscences and pseudo-reminiscences, fabrications, amnesia of patchy character, delusions of paranoid type or of grandeur, auditory hallucinations, absurd and fantastic delusions.

Action or Behavior: Hoarding of trinkets and useless objects, reversal of sleep habits with dozing during the day and wakefulness and restlessness at night, indecent exposure, incontinence of urine and feces, often coprophilia.

PSYCHOSIS WITH CEREBRAL ARTERIOSCLEROSIS

Onset may be gradual and is associated with the typical physical symptoms of arteriosclerosis of the brain; vertigo, head noises, tremors, unsteady gait, paresthesias, transitory "strokes", aphasias and apraxias. In some instances mental symptoms may not appear until after the occurrence of an apoplectic attack. In other cases mental abnormalities appear only after a series of epileptiform seizures. The mental symptoms can be summarized as follows:

Emotion: Emotional instability, tearfulness or laughter without apparent cause, irritability, inappropriate out-

bursts of temper (morbid anger), suspiciousness, depression may occur with the realization of mental incompetency, states of morbid apprehension and panic, terrifying dreams which disturb sleep.

Ideation: Transient states of clouding of consciousness and confusion, disorientation, difficulty in concentration and attentiveness, memory defects, especially for names; apraxia or aphasia following transient epileptiform or apoplectiform seizures, mental preoccupation with fears and delusions of threats of bodily harm.

Action or Behavior: Carelessness and slovenliness in personal attire, neglect of personal cleanliness, episodes of violence, restlessness both day and night, fatigueability, fairly rapid disintegration with increasing frequency of "strokes" and cardiovascular impairment.

INVOLUTIONAL MELANCHOLIA

The psychotic stages of involutional melancholia are extremely distressing both to the patient and to those caring for him.

Emotion: Anxious depression, despondency, hopelessness, fearfulness, self-accusation of the most horrible crimes, constant protestations of guilt and need for punishment.

Ideation: Consciousness not clouded, no intellectual deterioration. Fearful delusions of body disruption, of horrible punishment. Self-accusation of unpardonable sins and crimes against family and all humanity, raking over the past in search for every possible sin of omission or commission. Fear of being put to death, imprisoned, "boiled in oil." Hallucinations of terrifying nature.

Action or Behavior: Agitation, restlessness, pacing of the floor, wringing hands, resistive and negativistic, uncooperative, great danger of violent suicide, refusal of food, rapid weight loss because of refusal to eat and intense agitation.

ALZHEIMER'S DISEASE (Pre-senile psychosis)

This disorder develops in the 50's but occasionally as early as the 40th year. It is a rapidly developing organic deterioration due to destruction of the cerebral cortex, especially in the frontal areas. At the onset memory begins to fail and mental confusion, disorientation and aphasic and apraxic phenomena rapidly make their appearance. Early in the course of the disease an irritable, anxiously depressive mood occurs, later giving way to profound apathy and loss of interest. Slurring of speech, complete interruption of associative relationships, inability to read or write, and apparent absence of mental life (dementia) occur in the remarkably short space of three to five years.

PICK'S DISEASE

This rare organic cortical degenerative disease occurs between the ages of 40 and 50 years. Women are more frequently afflicted than men and in the author's experience there is some familial factor. The mental deterioration is due to progressive atrophy of the cerebral cortex, especially marked in the frontal and temporal areas. Early symptoms are headache, emotional instability, apathy, distortions of time relationships, and uninhibited, hilarious overactivity and silliness. Aphasic and apraxic phenomena occur and convulsive seizures are not uncommon. There may be constant repetition of stereotyped

words or phrases having little or no meaning. There is a predominance of focal neurological signs, particularly aphasia, alexia, apraxia, spasticity, positive Babinski's sign and hemiplegias and monoplegias. Deterioration is rapid.

Treatment

SENILE AND ARTERIOSCLEROTIC PSYCHOSES

Since arteriosclerosis, deterioration of cellular elements and even large areas of softening or destruction are found in routine autopsy studies of aged persons in whom there has been no evidence of mental breakdown, it must be concluded that organic brain damage in itself is not the primary cause of psychotic disturbances. It is unlikely that more than a fifth of the persons with fairly extensive organic destruction experience mental breakdown. The deciding factor may be an inherited tendency, the element of chance in the location of the lesion or lesions or additional unsuspected pathogenic agencies. Circulatory disturbances, nutritional defects, avitaminosis, dehydration, toxemia and infectious disease are the largest contributing factors. The element of cerebral anoxia is obviously a concomitant factor in these contributing disorders. Therapeutic measures based on the correction of these reversible factors, therefore, constitutes the major treatment effort.

1. *Removal of sources of infection*, such as diseased teeth and tonsils, when this is possible, and treatment of such sources by less drastic methods when removal is impossible, so that toxemia resulting from infection may be reduced to a minimum. Vaccine treatment of infection and its consequences may offer promise in cases where the foci of infection are not removable. Extremely small vaccine dosage is advisable for elderly patients.

2. *Correction of constipation* is imperative, since this is a chronic disorder among the aged. Stasis of bowel function may reach the point of fecal impaction and examination of every patient for such conditions is important. Mild laxatives and various combinations of mineral oil and agar should be used, and in severe cases of chronic constipation with toxic absorption high enemas and colonic irrigations may be found to be necessary.

3. *Administration of a high caloric, high vitamin diet* is a requisite. In some cases tube feeding may have to be resorted to because of lack of cooperation. Additional vitamins are essential and may be given in the form of fruit juices and daily doses of two tablespoons of cod liver oil and six yeast cakes. Vitamin B concentrates in the fractionated form are recommended, the average daily dose in severe cases of malnutrition being 30 mg. of thiamin chloride by intramuscular injection, and daily oral administration of 75 mg. of nicotinic acid and one ounce of vitamin B complex syrup.

4. *Administration of abundant fluids* is advisable except where kidney disease, cardiac decompensation or other forms of circulatory embarrassment are specific contraindications. A simple routine is to give between-meal feedings of egg-nog, malted milk or fruit juices, for the purpose of supplying both nutritional and fluid needs. Dehydration is a very common finding in the general medical examination of elderly persons, and in severe cases we have found it necessary to give 5 per cent glucose solution by hypodermoclysis or by rectum.

5. *Rest* is an almost universal requirement in this category of patients. During the first few weeks of hospitalization cases should be kept at rest for the greater part of the day, although in general it is advisable to avoid strict bed rest over long periods because of the danger of hypostatic pneumonia. The use of sedation in restless, agitated, uncooperative psychoses requires caution. In general, we have found it advisable to avoid the use of bromides because of their rapidly cumulative toxic effect. The preferred drugs are the milder barbiturates. Overdose of sedatives is to be avoided because of the danger of aggravating the already existing mental confusion.

6. *Exercise, occupational work and physical therapy* are useful. After patients become well-nourished and rested and sufficiently free from physical handicaps to make them advisable, athletic activities suitable for elderly persons may be prescribed, such as bowling on the green, golf, walks, croquet, shuffle-board and the like. It has been found particularly important in this age group to evaluate the patient's physical capacity and manage the program of recreational activities accordingly. For cooperative patients, occupational therapy in the form of useful hobbies which the patient has formerly had, and is able to remember, can be utilized with benefit. Mild physiotherapy, such as massage, ultraviolet irradiation, mild cabinet baths and hydrotherapy, is usually prescribed, in addition to the normal requirement of fresh air and sunshine.

7. *Psychotherapy*: Psychological treatment has a very real place in the management of any phase of the old age problem. In the prodromal stages and in the period of convalescence from psychotic breakdown it is essential that an effort be made to re-create or re-establish a sense of worthwhileness, of self-sufficiency and an awareness of being wanted and needed. It is too often the case that, with or without reason, the elderly person feels that his family and society would be glad to be relieved of his care and that they have put him "on the shelf." In the psychotic cases an attitude of kindness and understanding in those taking care of them should be stressed as a therapeutic requisite. Preventive psychological measures are discussed under the heading of Mental Hygiene of Later Life.

INVOLUTIONARY MELANCHOLIA

All attempts to treat true involutional melancholia psychosis with endocrine therapy, psychotherapy and various combinations of the two have resulted in about 38 per cent recoveries. In our experience³ these methods have fallen far short of the recovery rate which can be anticipated by the use of shock therapy. Metrazol convulsive shock produces an average recovery rate of 73 per cent but the percentage of fractures due to the violence of the induced convulsion has been so high that it almost precludes its use in unmodified form. The introduction of electrical shock therapy or "electro-convulsive therapy" has not only reduced the incidence of fractures and other complications but has enhanced the recovery rate. Furthermore, the use of curare, given by intravenous injection just before the electric shock, has reduced the danger of fracture to a negligible figure. Our⁴ present recovery rate in involutional melancholia treated by electric

shock therapy modified by curare is somewhere between 85 and 90 per cent.

PREVENTIVE MEASURES

Adaptation of hospital treatment measures used in the senile and arteriosclerotic disorders can be applied in the home as preventive treatment by the general practitioner. In cases showing prodromal symptomatology such measures are imperative, and in all persons approaching the old age brackets it becomes increasingly advisable for the physician to examine periodically for possible foci of infection, and review the diet, fluid and vitamin intake, elimination, habits of rest and exercise and the amount of fresh air and sunshine which the patient receives. Of the more important measures, adequate rest is found to be the most difficult to secure in the home, especially among persons of narrow means. Elderly women particularly are often motivated to do daily work far beyond their strength by desire to serve the families which give them their homes. Kindness is another requisite sometimes lacking in the home. Situations presenting economic problems or difficulties of family management will be dealt with according to the judgment of the physician, assisted by statistical knowledge that liability to mental breakdown increases with age. During the period of senescence, comparable in susceptibility to disease to that of infancy, it may be expected that where preventive treatment is carried out it will yield a greater reduction in the number of committed cases of senile psychoses than was obtained by hospital treatment of such cases after breakdown had occurred. The substantial rise in the numbers of old age psychoses represents the end effects of pathogenic forces at work in our entire elderly population and suggests the need of instituting a widespread systematic program for preserving somato-psychic health in the aged, approaching in scope that now in effect among children in our public schools.

THE MENTAL HYGIENE OF LATER LIFE

The general mental hygiene efforts in the later life era will undoubtedly be aided by the present trend toward some federal recognition of the problems of the aged. Some of the formerly unanswerable problems of economic insecurity are now in the process of becoming settled by old age pension systems, both in Federal and State governments, and by private measures. Some of the mental hygiene suggestions can be summarized as follows:

1. Physicians, who undertake treatment of patients who are at this life era, not only should attend to the organic factors, but also should give advice and counsel concerning social-environmental handicaps and should penetrate the minds of the patients at least deeply enough to discover and uproot any erroneous conception concerning the likelihood of the development of mental disease. Since, as Oliver Wendell Holmes has said, "to achieve longevity one must first choose ancestors of long life," and, since senile mental deterioration and psychoses with cerebral arteriosclerosis are thought to be inherent tendencies, it will be wise for the physician to evaluate in each patient the inherited potentialities for soundness of mind and body.

2. The long interest and focus of energies upon child

bearing and rearing of the children has now come to a close and new interests and activities must be substituted. Not in every case can the solicitude and care for grown-up or maturing children be easily relinquished. Parental education should, of course, be begun much earlier than at old age, but one of the problems of mental hygiene is to point out to elderly parents how necessary it is for their children and grandchildren to lead their own lives. Anxious care may intrude into the lives of the young persons and rebellion against or rejection of the parents is sometimes the unhappy result. Apparent rejection of the parent by the children is thus added to the already heavy burden of disappointment, frustration and regret characteristic of this life era. The physician must help parents to understand the normal rebellion against parental authority and to see that too selfish tactics in attempting to circumscribe the life of a younger person, or crushing this rebellion, can result badly not only for the child but also can produce untold needless mental anguish for the parent.

3. Compensations and substitutions for the former solicitude directed toward the children and family interests must be sought. It will tax the ingenuity of the practitioner to overcome the rapidly constricting sphere of interest and to generate enthusiasm for women's clubs, political interests, various hobbies (gardening, small-time farming, etc.), travel, organized recreations and other wholesome outlets. The patient should be helped to see that now, when the need for close supervision of children is no longer necessary, they have unusual opportunities to carry out long cherished wishes for personal satisfaction. It may be essential when the process of isolation has begun and is in danger of becoming fixed that a formal schedule of activities and planned campaign be drawn up to combat the increasing egocentricity and contraction of the patient's life.

4. Withdrawal from occupation must never be abrupt and, if possible, should not occur until other interests are ready to absorb and keep alive the patient's mental energies.

5. It is a most common conviction among both men and women that after the menopause sexual interest disappears and with it all possibility of sexual gratification. Abundant evidence shows that this is not the case. Sex interest may decline gradually during the fifties, but arrival at age sixty does not mean withdrawal of sex interest from life, nor abrupt senile atrophy of the genital organs.

6. The psychotherapeutic attack must be varied, taking into account the psychological make-up and background of the individual and the assets and liabilities of the patient as of the moment he presents himself to the physician.

7. Athletic activities, specifically designed for elderly persons, should be further developed, i. e., bowling on the green, walks, croquet, shuffle-board and the like. It is more important in old age than anywhere else to evaluate the patient's physical capacity and match this by a program of recreational activities.

If mental hygiene efforts are to be successful in the prevention of *involutional melancholia*, the physician must be alert to the inherent dangers in the too strongly inverted, inhibited, highly repressed, narrow personality. Every effort should be made to "free up" the emotions, to promote relaxation, vacations, hobbies and extraverted social interests. Throughout the histories of the typical involutional melancholia patient constantly run the same phrases, "he was a man devoted to his work, never took a vacation," or, "she was a devoted mother, worrisome about her family, conscientious to a fault," or, "she was a self-effacing, self-sacrificing, altogether consecrated person." These laudable traits are not to be deprecated and in our present world are very much to be praised, but even devotion and self-sacrifice can have their dangers when carried to extremes. The almost fanatical exclusion of all recreational interests and the marked restriction of pleasure seeking interests spread into every sphere of the patient's existence. The physician who is mental hygiene conscious will have little difficulty in recognizing the unwholesome nature of such traits.

Not only in regard to life-long personality traits does involutional melancholia possess a high degree of predictability but, also, in the long-germinating prodromal period there are numerous signs of failing control which should warn the physician of approaching danger. In our study, 86 per cent of cases had a prodromal period of six months or longer and 54 per cent one year or longer. It is the extraordinary length of this prodromal struggle and the unusual resistance of the patient which are the concern of mental hygiene. Time favors the corrective attack.

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Eye Problems in the Aged

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DEGENERATIVE and atrophic changes in the eye, which in many instances are easily visible, are the fingerprints of cells which change from active to inactive cells or completely atrophic cells. These changes of sclerosis, depigmentation, hyalinization and fatty degeneration are frequently visible to the unaided vision. That such was not merely a matter of years was stated by Browne—"Many grow old before they arrive at age." No one can tell exactly where a physiologic process stops and the pathologic process begins. Many low-grade progressive toxemias accentuate the normally

aging tissues, as does the stress and tension of living, high living, and the shocks of illness and trauma.

One of the common cosmetic defects of age is a bulging of the orbital fat above and/or below the palpebral fissure. This change is caused by a thinning of the septum orbitale, the thick fibrous membrane derived from the dura and the periosteum of the orbit, which protects and supports the orbital contents. The defect may be sufficient to cause a drooping of the upper lid over the eye and necessitate a resection of the weak portion of the septum.

CHANGES IN APPEARANCE OF THE EYE

Age changes the appearance of the eye itself. The shining white sclera of youth takes on a yellowish color due to the fatty degeneration of the whole sclera. A small yellow spot, the pinguecula, appearing at the lateral poles, gives the appearance of a neoplasm. This deposit of hyalin tissue occurs more frequently in those exposed to the elements but rarely, if ever, calls for excision. Fat deposits also occur in the cornea, not involving the limbus. These are round or elongated droplets, present in the intervening spaces, and limited by Bowman's membrane superficially, but extending toward the sclera in the deeper layers. This gives the appearance of a terrace on microscopic section. Only a few cases are seen where the fat deposits become so pronounced as to leave only a small clear section in the center of the cornea. While these two processes do not involve the loss of vision, they represent two of the major processes which go on throughout the eye, i. e., hyalinization and fatty degeneration.

CHANGES IN THE CORNEA

According to Priestly-Smith, the corneal diameter lessens in age—an actual decrease of .5 mm. in diameter taking place from the third to the seventh decade. Salzman thinks this possibly may be due to a lack of transparency. There is likewise a flattening of the cornea, more in the vertical meridian with an increase in the perverse astigmatism. This increase is likely to be marked after seventy years. Among the less common causes of visual disturbance in the aged are those of degeneration or dystrophy of the cornea. Of these keratitis sicca, and epithelial dystrophy of Fuch's are definitely senile in character, are not familial, and show other evidences of age changes in the body.

Keratitis sicca is a drying of the cornea, with a tendency toward the formation of epithelial filaments due to lack of tears. Seen most commonly in women past the menopause, sometimes in association with arthritis or a vitamin A deficiency, the superficial epithelium breaks down, or forms long epithelial filaments. The secretion of tears, as measured by a piece of filter paper 5 mm. in width is nil, or less than 15 mm. in five minutes, the normal minimum. A lowered visual acuity, scratchy irritation of the eyes, and marked discomfort on reading, are the usual symptoms. The use of Locke's solution containing .7 of 1 per cent gelatin is used in place of the absent tears. Complete closure of both tear ducts by surgical means is necessary in the more pronounced cases.

Fuch's epithelial dystrophy is a degenerative condition of the superficial epithelium seen in elderly people. The superficial corneal epithelium becomes gray and cloudy with the formation of small corneal bulbae. The vision is markedly reduced. In most instances there is some increase of intraocular pressure, or it may follow a cataract extraction. In others it is independent of any surgical procedure. In one of my cases, it followed extraction of a cataract in a patient previously operated by me for glaucoma. The genesis of the condition from microscopic study with the corneal microscope and from sections, is a degeneration of the corneal endothelium which permits fluid to seep into the cornea, destroy the epi-

thelium and later destruction of the entire corneal tissue. In microscopic sections there has been a destruction of the entire endothelium, (which Verhoeff calls mesenchymal epithelium) and the formation of warts on Descemet's membrane.

CHANGES IN THE LENS

There is a universal growth of the lens throughout life until very old age is reached. According to Priestly-Smith, there is a growth of from 8.67 to 9.64 mm., with an over-all variation of .75 mm. from the second to the eighth decade. These lenses may also be 5 to 6 mm. in thickness. Saunte gave 3.6 mm. as the thickness of the lens at 20 years and 4.5 mm. in thickness at 50 years. Such indicates a universal increase in all diameters.

Senile changes may be both of physiologic and pathologic origin. Physiologic age changes in the lens run concurrently with evidences of senescence in other organs of the body, more particularly with changes in the epithelial tissue; hair, skin, etc.

The physiologic changes are a sclerosis of the lens nucleus, with a loss of nuclei of the lens fibers. This causes the whole nucleus to become a homogenous resilient mass from the pressure of newly formed fibers in the lens cortex. Coincidentally there is a loss of water, insoluble protein replaces the soluble and oxidative metabolism is lost. Duke Elder thinks color changes in the lens nucleus belong to the pathologic, while Salzman describes color changes on a physiologic basis.

Another physiologic change is the contour relief, especially of the suture lines. These may become so easily visible as to be seen with feeble illumination and little magnification.

One may find extreme degrees of nuclear sclerosis with little effect upon the vision except lenticular myopia, and a disturbance of color vision, especially blue. On the other hand, a not too great sclerosis may reduce vision to a minimum, especially for reading, even while the fundus is clearly visible through the sclerosed lens. Such lenses require extraction to enable the individual to pursue a gainful occupation or enable him to follow a happy existence. Later we shall see why these physiologic changes, in addition to being a factor in the loss of accommodation, producing presbyopia, also cause other serious changes in the circulation of ocular fluids.

Pathologic changes in the lens are dependent upon faulty metabolism, heredity, progressive toxemias of low degree and malnutrition. These result in the death of lens fibers, vacuole formation with or without fluid, and various other types of senile cataract. There is an ultimate death of the entire crystalline lens system.

CHANGES IN THE UVEAL TRACT

The uveal tract which comprises the iris, ciliary body, ciliary processes and chorioid, undergoes a universal degeneration and atrophy in old age. Physiologic age changes are practically of constant occurrence, but are frequently seen early in life after acute disease, and indicate that such processes may rapidly increase the aging processes. Whether true or not, these universal changes are an atrophy of the mesodermal stroma, with deposition of hyalin and collagenous material; deposits of fatty droplets in the intervascular spaces; depigmentation and degeneration with proliferation of ectodermal epithelium.

THE IRIS

The iris changes are characterized by a thinning of the whole structure with loss of crypts, and a sclerosis of the vessel walls. Connective tissue, sparse normally in the iris, is replaced by much hyalin tissue, sufficient at times to form a ring at the pupillary margin. This latter may cause senile myosis. The vessels often seen as fine white lines are greatly thickened but remain patent. Pigmentary degeneration regularly occurs, with pigment becoming deposited on the posterior corneal surface, the surface of the iris and, more especially, in the pectinate ligament.

The pectinate ligament or the trabeculae of the anterior chamber is also involved in this sclerotic process. Proliferation of the collagenous material from which the ligament is derived, deposition of hyaline material, and sclerosis of the lamellae themselves are constantly seen.

THE CILIARY BODY

Rones, among others, has given an excellent description of the degeneration which occurs in the ciliary body in senility. Such changes, occurring after 40 years, are a large factor in the production of presbyopia, so ably described clinically by Duane. In this process, there is an atrophy of the muscle tissue, a deposit of connective and hyalin tissue between the fibers, and a complete hyalinization of the ciliary processes. In addition, the change involves the pectinate ligament as previously described. The ciliary processes themselves become larger, pushing toward the base of the iris, and embarrass the size of the posterior chamber due to the enlarged lens. These enlarged processes may also block the trephine opening of the glaucoma operation.

In addition, fatty droplets may occur in the fibers of the muscle itself, in the non-pigmented portion of the ciliary epithelium and in the interstice of the sclerosed tissue. Fatty degeneration occurs more regularly in the late senile where the vessels beneath are severely sclerotic.

CHANGES IN THE CHORIOID

Since the chorioid is primarily a highly pigmented tissue, it gives visible evidence of vascular changes which are taking place in other organs at the same time. In the intima there is a fatty degeneration characterized by deposits of fat in the endothelial cells. The muscular coat is replaced by fibrous and hyalin tissue until the whole wall is replaced by fibrous and hyaline tissue and assumes the appearance of a white line. Since the chorio capillaris is the main blood supply to the deeper layers of the retina, this sclerosis affects patchy areas, while in others the circulation appears quite normal. This sclerosis affects primarily the area of the posterior pole, and is quite evident ophthalmoscopically. At times there is a sclerosis of all the vessels in the immediate neighborhood of the optic nerve.

Resulting from the capillary sclerosis is a degeneration of the pigment epithelium, both absorptive and hyperplastic changes occurring. These changes are evident in 65 per cent of persons in the fifth and sixth decades, principally in the peripheral regions, but by no means limited to this area. When depigmentation occurs, the cells are likely to be vacuolated and infiltrated with fat droplets. In some instances these fat droplets are changed to cholesterol and then assume the appearance of tiny silver specks.

Hyperplasia of the pigment epithelium often occurs

around a depigmented area, and gives the appearance of heaped-up pigment. Such lesions occur also in presenile individuals, and in pathologic inflammations. Regression may also occur with an actual improvement in visual acuity. The relationship to focal infection, low-grade toxemias, and acute illness remains an unsolved problem.

Salzmann and others deal in considerable detail with the formation of warts or verruca on the various glass membranes. Those of the cornea are usually peripheral and may be associated with Fuch's epithelial dystrophy—(Lloyd Verhoeff). Verruca or warts occur commonly on the glass membrane of the chorioid, or Bruck's membrane, and are a secretion from the pigment epithelium. Regularly present in the periphery, they are not always visible. When in the posterior polar region, they appear as rounded white elevations with a darker halo. In the macula area, one occasionally sees, large cuticular secretions two or three times the size of the disc. One which I observed was elevated irregularly and might easily have been mistaken for a chorioidal neoplasm. Lesions in this area produce a central scotoma and complete loss of central vision.

CHANGES IN THE VITREOUS BODY

Senile degeneration of the vitreous occurs regularly in persons over 50 years of age, the individual complaining of a fly or speck in front of the vision. Liquefaction of the vitreous gel results in an accumulation of the supporting fibers of the vitreous into strands. Liquefaction occurs more commonly in the anterior portion than in the posterior pole. Vision is seldom affected unless the opacities appear directly in front of the foveal area. Treatment is usually unwarranted and of little value, as the opacities tend to disappear spontaneously. If definite and known etiologic factors are present they should be treated, however.

Crystals floating in the vitreous body are of two types, cholesterol and calcium salts. Synchysis scintillans is the name given to large numbers of cholesterol crystals floating in the liquefied vitreous or situated in the lower part of the quiet eye. They may be of silver or gold color, rapidly moving on motion, and settling so quickly as to make their shape indiscernible. They have little or no effect upon the vision. Asteroid bodies are large numbers of round globules of calcium salts which float in the anterior portion of the vitreous. Occasionally coalescent, they may form a large body of soapy appearance and may produce a slight visual defect. Treatment is of no avail.

The three major eye problems of the aged are cataract, chorioretinal degenerations of the macula, and glaucoma. Glaucoma, because it is the most common cause of blindness, heads the list and is, undoubtedly, one of the most difficult of all ophthalmological problems.

Certain safeguards have been introduced to make the cataract extraction successful in more than 95 per cent of cases. Among these, the removal of foci of infection, rigorous control of the diabetic, elimination of malnutrition, and extreme care against sepsis have helped greatly. The use of vitamin C in doses of from 150 to 300 mgm. before the operation and during the period of convalescence seems to have reduced greatly the occurrence of hemorrhage from the newly formed capillaries of the wound. Improvement in technical detail, by the use of

corneoscleral sutures, almost eliminates the possibility of breaking open of the wound, and reduces the period of absolute quiet. Also the injection of air into the anterior chamber after completion of the operation, reduces the possibility of secondary glaucoma to a minimum. Introduced by Burch, it produces an immediate reformation of the anterior chamber, being absorbed after five or six days, and replaced by aqueous. Used routinely after cataract extraction of either the intra- or extracapsular type, it is considered a major advance.

Glaucoma, occurring usually after senile changes have taken place, may, in many instances, be due to purely physiologic senile changes. As stated previously, the pectinate ligament is sclerosed, hyalinized, and filled by pigment granules from the iris and ciliary processes. The normal growth of the lens reduces the depth of the anterior chamber, and the size of the circum lental space. The hyalinized hyperplastic ciliary processes encroach upon the iris and the angle of the anterior chamber, and the degenerative changes in the ciliary body fail to open the iris angle widely. Every person over 40 years of age is a subject for glaucoma and a careful ophthalmologic examination must include a record of the intraocular tension. Increased intraocular pressure in association with a sclerotic lens or cataract is not uncommon, and presents a difficult problem. Some surgical procedure to lower the intraocular pressure before extraction of the lens is advisable. There are many advocates for the Elliott trephine operation but I, personally, prefer a broad iridectomy or an iris inclusion operation unless the angle of the anterior chamber is deep. A large ciliary process may completely block the trephine opening. Extraction of the lens may be done on the lateral side of the eye—rather than above—after satisfactory control of the elevated pressure. Operative interference is indicated when miotics fail to control the increased tension, when there is a continual decrease in the size of the visual field, or when miotics are required four or more times daily.

CHANGES IN THE RETINA AND MACULA DEGENERATION

Changes in the retina are uniformly found in senility, characterized by thickening in the vessel walls, cystic degeneration, and pigmentary degeneration of the macula. Since retinitis per se does not occur in any stage of arteriosclerosis without hypertension, except rarely in diabetes, retinitis constitutes a disease entity, and is not considered here. The arteriosclerosis does produce a loss of transparency, increased neuraglia tissue, and a thinning of the neural elements. These latter changes, principally microscopic in nature, may give rise to marked contraction of the visual field without ophthalmoscopic evidence.

CYSTIC DEGENERATION

Cystoid or cystic degeneration of the retina, is a degenerative condition occurring regularly in the periphery and rarely in the macula area. Spaces within the retinal tissue are formed early in life, from 16 to 20 years in the extreme periphery, and gradually extend as age advances. These cystic spaces which ultimately produce a loss of all the nuclear and supporting tissue except the outer and inner limiting membranes, may contain fluid and increase the thickness of the retina from two to three times its normal thickness. Since this portion of the retina is

usually invisible, except under very favorable circumstances, loss of vision is not noted. The process is, however a purely degenerative one, without inflammatory reaction. Rupture of such cysts may, however, explain the presence of retinal holes without detachment.

Cystic degeneration of the macula area occurs less frequently than in the periphery but has the same pathologic characteristics. Cystic spaces formed in the substance of the retinal tissue are most easily seen by red free light or the binocular ophthalmoscope. If the cysts rupture, leaving only the internal limiting membrane, one observes a round hole, with a deep dark background, slightly pigmented in color. A halo may be present around the hole which varies in size from one-quarter to one disc diameter in size. Should the internal limiting membrane rupture also, a detachment of the retina in the macula area follows. Pigmentary degeneration of the epithelium of the chorioid rarely ensues unless detachment follows.

COLLOID DEGENERATION

Colloid degeneration is the formation of warts or verucca on the glass membrane of the chorioid. These are universally found after 40 years and may appear as small rounded white or yellowish dots in the macula area. Here they have been noted as Gunn's dots. As such, they have no effect upon the vision. In other instances, the whole fundus may be diffusely covered by fine white dots. Occasionally one sees massive colloid degeneration, in which the excrescences are much larger, sometimes coalescent and giving a very white appearance to the fundus. Rarely, a large area of the macula is involved by massive degeneration with complete loss of central vision.

SENILE MACULA DEGENERATION

Senile macula degeneration is a slowly progressive degeneration of the pigmented epithelium, due to sclerosis of the chorio capillaris and a common cause of loss of central vision in the aged. The process is limited to the macula area even though changes are present throughout the chorioid, indicating the vulnerability of this area. Both eyes are eventually involved in the process. The degeneration begins by an increased pallor in the central area, accompanied by the deposition of pigment granules in the retinal tissue, sometimes in the form of a ring. The area is usually round or crescentic in shape, with irregular edges, with increasing pallor in the center and more or less pigmented granules deposited in the retinal tissue. Ultimately, an absolute central scotoma develops. In the later stages, hemorrhages may be seen in the periphery of the lesion although by no means are they essential to the picture. Vision is sometimes completely lost in one eye before the other is involved, but evidence invariably appears in the other also. Treatment is of little value. Tissues harboring infections should be removed, and vasodilator drugs may be tried.

SUMMARY

Age changes in the eye are characterized by sclerosis of the vessels, hyalinization, fatty degeneration and infiltration; degeneration of the pigment epithelium, both regressive and hyperplastic, and colloid degeneration of the glass membrane. The most common causes of visual loss are cataract, glaucoma, and macula degenerations. The last mentioned is resistive to treatment.

The Teeth and Aging

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THIS discussion is that of a practicing dental clinician, whose laboratory is the human oral cavity, whose guinea pigs are the teeth, developed, nourished and erupted to form the denture in the jaws. The purpose of the denture is to serve the human organism with a dividing and grinding mechanism of the masticatory system by which food is prepared for ingestion. This system embraces not only the teeth, but the bones of the jaws in which they are securely placed; the muscles by which they are operated; the nerve and blood supply which innervates and nourishes the whole organism; and that part of the glandular system in particular which is responsible for the salivary secretions with which the triturated food is insalivated and in which and by which the teeth and oral cavity are constantly bathed.

Man has been provided by nature with two sets of teeth, the deciduous and permanent. The deciduous are twenty in number and are designed and intended to serve wholly or in part through childhood, beginning at the ending period of lactation and up to the beginning of adolescence.

The permanent set consists of thirty-two in number designed to serve throughout adult life. If natural teeth are to serve man in senility, they cannot be lost in childhood.

DEVELOPING TEETH IN THE EMBRYO

As early as the sixth week in embryonic life, there is histologic evidence of the developing tooth germs of the deciduous teeth, and very soon thereafter the budding for the permanent teeth is demonstrable.^{1,2,3} The period of embryonic and fetal development is perhaps more important for the teeth than for any of the other tissues in the body, because of their more unchangeable character when developed as compared to other tissues.

It is most important therefore that a physician should be in charge of the health of the prospective mother practically from the moment of conception, and that he should prescribe and direct the means and methods of securing and maintaining adequate nutrition throughout the period of gestation and lactation, assuming that the baby is to be breast fed. In this connection (if a dental clinician may presume to express an opinion), to insure good teeth for her child, every well-nourished mother should breast feed her baby if this is at all possible. For normal dentition and strong, vigorous, resistant teeth, the odds are almost invariably in favor of the breast-fed infant over the bottle-fed one.

The slogan, "A clean tooth does not decay," should be changed to, "A well nourished tooth does not decay." Well nourished teeth keep clean.

It must be borne in mind that as early as the fifth month in utero all the twenty deciduous teeth are developing and the first evidence of calcification is apparent. Also it is important to remember that while there is no evidence of calcification in utero of the permanent teeth,

budding for certain of them begins as early as three and one-half months³ and by birth all of them, with the possible exception of the third molars, are rapidly approaching the point of beginning calcification.

To what extent heredity is important in giving character and quality to the teeth is not known, but recent investigations, such as those made by Weston A. Price,⁴ are convincing evidence to the dental clinician if not to the laboratory research worker, that environmental factors are perhaps more important than heredity for the development of well-formed jaws, sound teeth and healthful bodies. Of the environmental influences, nutrition may well be considered paramount. Indeed, civilized man should know that adequate nutrition insures health, malnutrition secures disease.

The practices of some primitive peoples—as revealed by Price—of providing special food to couples contemplating marriage for months before the ceremony, in order to endow them with vigorous health, might be advantageously employed by supposedly more enlightened civilized people. Such practices may be based upon more scientific foundations than has thus far been revealed. It is at least wise to maintain adequate nutrition for the prospective mother from conception throughout the gestation period since nutritional influence is constantly activating the developing tissues of the embryo.

DEVELOPING TEETH IN CHILDHOOD

A baby who has been facetiously described as "an alimentary canal with a loud voice at one end and no responsibility at the other," normally, at birth, does not present any erupted teeth. The newly born baby is much more, however, than the above definition implies. For one thing it has an oral cavity at the esophageal end of its alimentary canal in which are enclosed the maxillary and mandibular arches. These contain all the deciduous teeth in an advanced state of calcification, together with the developmental tissues of the permanent teeth now taking shape and position, one of which, the first permanent molar, is already beginning calcification.

In from four to twelve months after birth the enamel of all the deciduous teeth will have been completed; in from six to thirty months all will have been erupted; in from one and a half to three years their roots will have been completely formed.

As stated above, the first permanent molar begins calcification at birth. Calcification for the remaining twenty-eight permanent teeth begins at from three or four months for some, and at varying intervals of time for others, up to ten years for the third molars.

The enamel will have been completed for the first molars at from two and a half to three years; for the other twenty-eight the process continues from the fourth to the fifth year, through progressively longer periods of time, until it is completed at sixteen years with the third molars.

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The first molar is the first permanent tooth to erupt; this occurs during the sixth to seventh years. It is sometimes called the "sixth year molar." It takes its position distal to and approximating the second deciduous molar. There is nothing to impede or obstruct its eruption in its proper place. It serves therefore as a kind of key stone in the arches in the processes of permanent dentition.

The eruption of the first molar is followed closely by that of the incisors at seven to eight years and the remaining teeth appear at varying periods up to the second decade when the third molars may be expected. The period for the eruption of this tooth—frequently called the wisdom tooth—is unpredictable and in the jaws of civilized man its eruption may be often prevented by its impaction.

Root calcification is completed for the first molars by the ninth or tenth year and, excluding the third molars, all the permanent teeth will have completed root calcification by the end of the sixteenth year. The third molar is supposed to complete its calcification at twenty-five years. In civilized man it is regarded as the "black sheep" of the tooth family, and is treated as such. Its behavior is probably the result of degenerative tendencies in civilized man, and instead of being called the "wisdom tooth," it might more properly be termed the "unwisdom tooth."

It will thus be seen that the deciduous teeth are erupted and calcified during infancy and early childhood. Also all the permanent teeth, with the exception of the third molars, are erupted and completely calcified by the sixteenth year. Hence from the time of conception on through the adolescent years, correct dentition demands every favorable, intrinsic and extrinsic influence known to medical science. Adequate nutrition and natural living seems to be nature's prescription as evidenced in primitive peoples, who alone have perfect teeth.

MATURE TEETH IN THE ADULT

The child's definition of an adult, "one who has stopped growing except in the middle," is also applicable to his teeth, with this difference, however; the adult fills out while his teeth fill in. It is not deemed necessary in a discussion of this character to attempt detailed description of the histological structure or the anatomical forms of the various individual permanent or deciduous teeth. A brief consideration of the parts into which a tooth is naturally divided must suffice. These are the crown, the root and the pulp.

The crown of a tooth is composed of dentine with an outer covering of enamel. This is the part which erupts, and in common parlance is the "business end of the tooth." At the junction of the crown with the root is a slight constriction in the circumference called the "neck of the tooth." When the tooth erupts it exposes its crown without "sticking its neck out."

Enamel is the hardest substance in the body and since it forms the outer covering of the crown and is subject to various destructive agencies, it deserves special consideration. It is formed by the enamel organ through the activity of special cells, the ameloblasts. The enamel organ begins functioning at the line of union with the dentine,

called the dento-enamel junction, very soon after the pulp has begun to form dentine. The formation of the enamel proceeds from the dento-enamel junction outward. When the tooth erupts, the enamel organ is lost and thereafter there is no provision for repair of injuries to the enamel. It is a mooted question as to whether the enamel is nourished after calcification is completed and the crown has erupted. Composed predominantly of inorganic substances, the enamel contains only a small amount of organic material in its structure. It is formed through a process by which globules of enamel substances build up into more or less irregular, hexagonal prisms, all the parts being cemented together through a crystallization of an interprismatic substance that differs somewhat from the substance composing the rods. Not enough is known about this interprismatic substance, but on the degree of perfection of its crystallization largely depend the enamel's strength and its resistance to stresses and to destructive agencies. Tomes stated that enamel buried in the earth for thousands of years is no different from enamel on a newly erupted tooth. This statement is refuted by more recent authorities. Pickerill⁵ claims enamel becomes more dense, harder, more brittle and also less soluble as it is aged. He contends that usage brings about these physical changes. He classifies teeth with respect to their physical behavior into malacotic teeth (*malakos*, soft) and sclerotic teeth (*skleros*, hard). More recent investigators tend to discredit Pickerill's views. The experienced clinician who is compelled to provide himself with sharp burs and keen edged cutting instruments will generally recognize the difference between the physical resistance offered by mature teeth in adults and that of the teeth of young persons. Whatever theory may prove to be the truth, clinically enamel is the most important part of the tooth because of its resistant qualities, and it is highly necessary that during its developmental and calcifying stages it be given optimum nutrition. If no lesions ever occurred in the enamel, there could be no destruction of the tooth through carious processes. The truth of the dictum, *as endureth the enamel so endureth the tooth*, is recognized by all clinicians who are combating the ravages of caries in human teeth.

The root of the tooth is that part, single or multiple, which is hidden within the jaw, and is composed of dentine and cementum. The cementum forms the outer covering of the root and provides attachment for the periodontal membrane whose horizontal and oblique fibers are attached to the bony structure in which the tooth is imbedded. Within the crown and the root, and enclosed wholly by the dentine, is a space filled with the pulp tissue. This is the formative organ of the dentine. Through the functioning of its special cells, the odontoblasts, the dentine forms from the dento-enamel line inward. Irritations from without are transmitted through nerve fibrils that extend from the odontoblastic layer of cells within the pulp through dentinal tubules that radiate through the calcified dentine. Continued cellular activity permits the pulp to lay down additional dentine, called secondary dentine, to protect itself from injury from without.

The pulp is provided with a circulatory system and highly sensitive nerve fibers. Not until recent years has

the pulp been credited with having a lymphatic system so illy defined that infections in the pulp usually result in its death and decomposition. This is especially likely to occur in the teeth of adults after the root ends have been completely calcified, thus constricting the apical openings through which the pulp is attached to the periapical tissues. The pulp and the periodontal membrane are the avenues through which nourishment is conveyed to the tooth.

DENTAL CARIES

Dental caries has been designated the most prevalent disease afflicting mankind. It is classed as a disease which destroys the teeth through a process of decalcification and disintegration of the calcified structures. If the word disease be considered in its literal sense, dis—away, ease—comfort, therefore away from comfort—discomfort, then caries of the teeth may properly be classed as a disease. But from the fact that it is a destructive process universally prevalent in the teeth of civilized people, it might more properly be called a tooth malady of civilization. Indeed it is coincidental with the attributes of civilization. There can be no disagreement as to dental caries being a destructive process affecting the teeth and evidenced more conspicuously during childhood and the early adolescent years of civilized people.

Caries is first evidenced by a decalcifying action on the outer surface of the enamel and is confined in its initial stages to protected areas. The approximating surfaces of the teeth, developmental pits, fissures and structural defects offer favorable sites for plaque formation. Decalcification is effected through acids derived from fermentable foodstuffs. When the enamel has been penetrated to the dento-enamel junction, pathogenic and putrefactive organisms become active and assist the aciduric agencies in the destruction of the dentine. The dentine contains a much higher content of organic material than the enamel and through its decomposition foul odors characterize the progress of the carious activity. When the pulp is reached, infection generally ensues giving rise to acute pulpitis. This rapidly develops into a chronic state resulting in complete breakdown of the pulp tissue and a possible infection of the periapical tissues, and even in an alveolar abscess.

It is not necessary in every instance for the pulp to be exposed through the decalcification of the dentine in order to become infected. Pathogenic organisms may be carried through the dentinal tubules and infect the pulp any time after the enamel has been destroyed to the dento-enamel junction. Hence the importance of the enamel being kept intact and free from any breaks in its surface.

A considerable amount of laboratory research and animal experimentation has been and is being done to explain how teeth decay. Not so much has been done to explain why they decay.

The most encouraging reports on the etiology of dental caries and the means to be employed for caries prevention come from some of the endowed clinics for children.⁶ In these institutions clinical research is conducted under rigid environmental control and bio-chemico-physical knowledge is being employed in efforts to induce

optimum nutrition, growth and normal physiological functioning. In such institutions health is the goal. How to attain it and maintain it is the problem. In the past not enough consideration has been given to the study of health. Perfect health from the cradle to adulthood is the surest means of developing sound resistant teeth. A great advance will be made in medical science when all the diseases common to childhood can be eliminated. Exanthematous diseases in particular are responsible directly or indirectly for disturbance of calcium metabolism which results in hypoplasias of enamel and dentine.

A little volume entitled *Dental Caries*,⁷ published by the American Dental Association, contains summaries of the experimental work done by most of the recognized research workers throughout the world on the etiology of dental caries. In general, as usual, the summaries attempt to explain how teeth decay and not why.

F. W. Broderick⁸ of England gives the most comprehensive, and the least comprehended, discussion of the etiology of dental caries of anyone who has thus far written upon it. His contention that dental caries is the result of vegetative imbalances and systemic dysfunctions that give rise to an acidotic state of the individual, and that periodontosis or pyorrhea, as he chooses to call it, is the result of opposite and antagonistic imbalances and dysfunctions that give rise to an alkalotic state, deserves thorough study and comprehension before it can be condemned. Any observant, experienced dental clinician knows that *active* caries does not exist in a well-established state of periodontosis. *Active* dental caries is observed almost entirely in childhood and youth. Arrested dental caries and periodontosis are observed in adults usually beyond thirty years of age.

In all the summaries given in this Dental Caries volume, there is no unanimity of opinion. The dental clinician who wants to know what causes teeth to decay and how caries may be prevented, is more confused than enlightened. Those who consider dental caries from purely local action of acidogenic agencies might well adopt this slogan: *chewing gum, cake and candy cause caries.*

When a dental clinician, through observation and experience, ventures an opinion upon the etiology of dental caries he puts himself out on a limb easily sawed off by laboratory and animal research workers. They at once say such opinions are not scientific. But that does not change those clinical signs and symptoms met by him in the oral cavity and on the teeth, that indicate susceptibility or immunity to dental caries or periodontosis which he observes and believes he understands. Neither is his faith shaken in the belief that correct nutrition and wholesome living for children are the safest means by which to achieve healthful adulthood with sound teeth.^{9,10,11}

Edward L. Tuohy¹² in an article, "Feeding the Aged," published in the *Handbook of Nutrition*, states: "The mouth becomes the nutritional barometer of health." It may be no less truthfully said that the mouth becomes the malnutritional barometer of deviations from health. In mouths of persons whose nutrition is correct, whose physiological functions are normal and undisturbed, the teeth and gums reflect the health of the body. The teeth are

clean, free from deposits and reflect a radiant translucency indicative of vitality and resistance. The gums and oral cavity are free from inflammatory disturbances and present a pink color. The gums are firm and the gingival borders hug the teeth around their necks in loyal fashion. The saliva is clear, of a watery consistency, and shows a slightly alkaline reaction during the resting periods. The salivary glands respond promptly to stimuli to produce the normally abundant quantity of saliva needed for its functions of assisting deglutition and digestion. When malnutrition prevails systemic dysfunctions ensue and disease manifestations, in time, become apparent in the oral cavity. Chronic malnutrition induces chronic dysfunctions with manifestations of chronic disease. The dental clinician who is able to recognize a healthful oral cavity readily observes deviations from it, and with experience he is able to indicate from certain oral manifestations with some degree of accuracy the probable existence of certain chronic systemic diseases.

PERIODONTOSIS

There are actually but two distinctive disease processes which cause mutilation of the human dentures; dental caries active chiefly during childhood and youth and the destroyer of the crowns of the teeth, and periodontosis, the name adopted by the American Dental Association for an inflammatory disease process confined to the gingivae, periodontal membrane, cementum and the alveolar bone. If this latter process is allowed to progress, it will result in the total loss of all the teeth. While the teeth themselves may be entirely free from caries, they will loosen and come out in the course of time, as the result of the destruction of supporting tissues. Active caries is not seen in a well established case of periodontosis although arrested caries may be present. Periodontosis is found only in adulthood and is rarely seen before the eighteenth year. Its greatest destruction occurs between the ages of thirty to fifty. It is caused by systemic dysfunctions resulting chiefly from malnutrition. There are many contributing factors to malnutrition. Vegetative imbalances, mental disturbances—worries, vexations, etc., fatigue, dissipation, monotonous diets, etc., may, singly or collectively, contribute to malnutrition and systemic dysfunctions. Periodontosis like dental caries is preventable. Its action can be arrested and cured if interference is offered soon enough. The usual surgical curettage while indispensable in treatment is not sufficient to effect a cure. The cause, systemic dysfunction, must be corrected. An old dentist, who treated periodontosis by surgical means only, was heard to say, "I can't cure pyorrhea, but I can prolong it."

EFFECTS OF DENTURE MUTILATION

Until recently about the only consequences thought to follow mutilation of the natural denture was impairment of the masticatory apparatus. But so long as there were as many as two teeth left, one in each jaw, and they "hit", the apparatus was still "a good meat chopper." In 1918, Prentiss¹³ called attention to the seriousness of denture mutilation in its effect upon the temporo-mandibular joint. This joint is unique in its structure and function. It is formed by the condyle of the mandible

and the fossa of the temporal bone, and it is held in functional relationship by ligaments and tendons.

A cartilaginous disc is held between the head of the condyle and the convex undersurface of the fossa. The joint permits numerous motions to the mandible which is operated by the muscles of mastication. Normally occluding teeth in the denture establish correct intermaxillary dimensions. If mutilations occur in the denture, the teeth tend to shift, molar support is affected, a loss of intermaxillary dimensions results and pressure falls upon the disc which is not designed to bear stress. When there has been mutilation to the extent of complete loss of molar support unilaterally or bilaterally, pressure on the disc by the muscular pull in mastication will in time cause malpositions of the condyles with resultant lesions in the joint. Pressure by muscular pull upon a malposed condyle has been found to disturb the nerve supply in and adjacent to the joint, to cause facial neuralgias, tinnitus, headaches and a whole series of symptoms which are now generally spoken of as the Costen syndrome.¹⁴

In 1934 the author of this article began a systematic clinical research in the Washington University Dental Clinic on temporo-mandibular joint lesions.

A report was made in the form of a symposium to the Illinois State Dental Association, May 1943, on 100 cases treated. There were 90 per cent either completely or partially cured. Among the cases at that time were four diagnosed by physicians as having trigeminal neuralgia major. Each of them was entirely relieved of his pains and still remains comfortable. At the present time 10 cases of tic have been treated and each of them has responded favorably to the treatment.

The condylar malpositions are classified as follows: unilateral, bilateral similar and bilateral dissimilar.

The condyle may be superior, inferior, anterior or posterior and any combinations of these that can be formed in relation to its normal position. The normal is where there is no mutilation of the denture and the occlusion is perfect. The eye-ear plane which passes through the center of the auditory meatus and the orbital is found to pass about 1 millimeter above the upper crest of the condyle. From this norm, estimations are made on roentgenograms for the type of malposition and its degree. Eighty per cent of the 100 cases reported upon were of superior, superior-anterior or anterior types. Bite opening only aggravated the symptoms in all with such malpositions. The most stubborn cases so far have been of persons who have lost only the third molar. Third molars were intended for useful purposes.

In the course of dentition the jaws lengthen and enlarge to accommodate the erupting teeth. When the third molar erupts the jaws have reached their maximum dimensions. These new teeth being placed at the posterior in the arches are performing their proportional share in maintaining muscular and tendinal tone. When these teeth alone are lost, the mandible, being a mouldable bone, yields to the unsupported muscular pull on its posterior portion with the result that the angle formed by the union of the ramus with the body of the mandible is made less obtuse and pressure is created on the disc

in the temporo-mandibular joint in an anterior and slightly superior direction. It is exceedingly difficult to re-establish molar support in these conditions. The wholesale extraction of third molars on the assumption, "they are no good anyway," should be discontinued. Adequate nutrition and growth in youth would tend to effect perfect dentition.

CONSERVATION AND PREVENTION

The old colored preacher who said "God squeeze up a lump of clay, made a man out of it and stood it up against de fence to dry," was giving just about as plausible an explanation of man's creation as is being given today through scientific investigation. In man's final analysis he is reduced to the same elements as those composing the soil. He is dependent upon the elements of the soil and the air for his sustenance. The soil is his most precious possession; yet wherever civilized man has ruled he has adopted methods to evaluate everything, even life itself, in terms of money. Money is his goal, if not his god. He has learned nothing from the primitive peoples he has displaced with respect to their heritages of sound teeth that antedate written history. He has taken their lands, cultivated and impoverished them; destroyed and desecrated the forests; dammed and polluted the streams; built large cities and in general exploited and wasted the natural resources of the earth. He has converted the fruits of his labors into gold and in the U.S.A. buried the gold in Kentucky. His philosophy of life that has always led to war has not changed and even in this supposedly enlightened age he is now engaged in the most destructive war in all history. So what? It must mean that civilized man has his values wrong.

The story is told of the representatives of a civilized people who had conquered a continent inhabited by natives whose heritages extended back for perhaps thousands of years. They had developed into a hardy, healthful race with splendid physiques, sound teeth and healthful oral cavities. Their conquerors said, "You people have everything here that anyone should desire. The trouble with you is, you won't work." The chieftain of the natives queried, "Why should we work?" "To make money," was the reply. "Why should we make money?" was then asked. "Why so you won't have to work" was the answer. So the civilized man's philosophy of "work, to make money, so you won't have to work" has prevailed throughout the eras of civilization.

Surely the time has come when "We move in new directions."¹⁵ Civilized man must learn what life is all about, and adopt methods in his industrial and social relationships that will lead to conservation rather than destruction. The impoverished soils must be replenished, the forests replanted and maintained, the streams purified and made fit for aquatic life, and all the natural resources conserved for use and not exploitation. With the means of rapid transportation and refrigeration, nutritious foods grown upon replenished soils can be, through cooperative handling, placed upon the consumers' tables within a few hours from the time of shipping. Those who are engaged in the study of the soils, such as William A. Albrecht,^{16,17,18,19,20} Chairman of the Depart-

ment of Soils, Missouri College of Agriculture, Columbia, Missouri, are paving the way with scientific knowledge of the soil which is nature's laboratory for growing vegetation upon which animal life depends. In the fertile soil, nature has the prescription, man has not yet learned, how to grow nutritious foods containing all the minerals animals require, and all the vitamins known and unknown compounded in the proper ratio for assimilation. These do not require being processed through the "gold mills" to make them palatable.

The consumption of natural highly nutritious foods will go a long way toward preventing disease. Food, however, is not alone responsible for malnutrition. There are those imbalances induced by the stresses and strains of the present mode of civilized living, where, "work, to make money, so you won't have to work" is the accepted philosophy. There are the dissipations and indulgences by which civilized man punishes himself but would not inflict upon the lower animals, that are sources of food and revenue for him, that also are instrumental in his health degradation.

If this were adopted for a motto:

Health, not wealth, is fundamental;
Education, not ignorance, for direction;
Security in old age for everyone,
To bring wisdom and peace in reflection,

then, man in his aging with his natural teeth intact, could in sincerity and freedom worship God according to the dictates of his own conscience.

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Tuberculosis in Elderly People*

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THE importance of tuberculosis and especially of pulmonary tuberculosis in elderly people has been quite generally underestimated.

There has been a rather widespread impression on the part of the medical profession¹ as well as the laity that one was not likely to develop serious tuberculosis after the age of forty.

The frequent occurrence of the disease in adolescence and early adult life has been so often stressed that the havoc it causes in later life has not been realized.

There have been, it is true, fairly numerous discussions of the subject² in medical literature but these have not received the attention they deserved.

One reason that the growing menace to those who are younger from the tuberculosis of elderly people has not been realized, is that comparatively few of us have any conception of the number of old people who now live among us.

Most of us would be surprised to learn that there are in the United States nearly four thousand persons over one hundred years old; over eighty-seven thousand who have passed their ninetieth birthday; more than one hundred and ninety thousand who are over eighty; more than four and a quarter million over seventy; and eight and one-half million more in their sixties. These, with the thirteen million in their fifties, make a total of over twenty-five million persons over fifty, more than 20 per cent of our whole population.

That the proportion of old folks in our country has not always been as high as at present, is indicated by the following table from the United States census for 1940.³

TABLE 1
Percentages of the United States Population at Different Ages in 1870 and 1940:

	1870	1940
Under 5	14.3	8.7
5 to 9	12.5	8.2
10 to 14	12.5	9.0
15 to 19	10.2	9.4
20 to 24	9.4	8.6
25 to 29	7.8	8.3
30 to 34	6.5	7.7
35 to 39	6.0	7.2
40 to 44	5.1	6.7
45 to 49	4.3	6.4
50 to 54	3.8	5.7
55 to 59	2.4	4.6
60 to 64	2.1	3.6
65 to 69	1.3	2.9
70 to 74	0.9	1.9
75+	0.8	1.9
50+	11.3	20.6

The relative increase in oldsters has not been limited to any one locality but has been practically universal throughout the country.

In Minnesota⁴ the percentage of the population over fifty years old changed from 15.7 per cent in 1930 to 18.9 per cent in 1940. In the city of Duluth⁴ the increase has been from 17.3 per cent in 1930 to 23.9 per cent in 1940.

There has also been a relative increase of the older elements in the population in foreign countries⁵ which, however, has not been as uniform as in the United States. The percentage of the population over fifty in

*From the Duluth Clinic, Department of Internal Medicine.

England and Wales has risen from 14.4 per cent in 1881 to 22.4 per cent in 1931; in Germany from 15.8 per cent in 1880 to 21.8 per cent in 1933. In France the percentage of old people was already high in 1881 when 22.5 per cent of the population consisted of persons over fifty, but in 1931 it had risen to 25.5 per cent.

It would be interesting to consider the effect on the political and sociological problems of a country or the world, of the presence in it of a large and growing bloc of conservatives experienced in all the tricks of government and having considerable power in its control. Aggressive minorities have ruled the world throughout much of its history. We have had intimations of the influence of our older citizens in the popularity of the Townsend plan, and of old age security and pension schemes.

A few of the factors which have given relatively more people a long lease of life are evident. More children now live to grow up than formerly. The reduction in the mortality from the great plagues of typhoid fever, yellow fever, tuberculosis, and many other infectious diseases permits those who have reached adolescence to pass safely through early adult life. More people now have living wages, adequate nutrition, and sanitary housing. In France, the decreasing birth rate may have had something to do with the small proportion of young people in that country. In America, immigration for a time kept the percentage of vigorous young adults high.

We cannot tell how permanent the present large percentage of older people in the population will be. If continued wars become a serious threat to civilization, or if in their wake come widespread epidemics to which the weak and old can offer little resistance, life expectancy may again be reduced to what it was in the middle ages.

Now, however, at a time when nearly a fifth of our population is elderly, how much of it has serious tuberculosis, and how much of a menace to the rest of the community is the tuberculosis it has? Is there an increasing amount of tuberculosis in the latter decades of life?

Drolet's graphs⁷ prepared from reports of the United States Census Bureau show, in a striking way, how deaths from tuberculosis have decreased phenomenally at

TABLE 2
Mortality Rates from Tuberculosis, United States (Death Registration Areas) 1900-1940

Age	MALES			FEMALES		
	Rate per 100,000	Rate per 100,000	Rate per 100,000	Rate per 100,000	Rate per 100,000	Rate per 100,000
0-4	132	60	15	113	52	14
5-9	29	18	5	31	18	4
10-14	24	17	5	48	33	8
15-19	115	72	20	170	120	35
20-24	260	148	42	287	191	57
25-29	322	165	52	351	183	60
30-34	351	165	60	331	160	51
35-39	362	167	66	298	143	47
40-44	313	171	82	248	125	40
45-49	316	163	91	214	111	35
50-54	305	173	101	198	109	36
55-59	302	179	110	204	113	39
60-64	309	180	110	213	118	43
65-69	334	195	105	271	144	51
70-74	281	191	108	268	152	63
75-80	304	174	91	328	175	68
80+	289	188	91	307	145	68
All Ages	210	116	54	194	110	38

all ages in New York City in twenty years, and how the mortality rate from tuberculosis among old people has remained relatively high.

From these figures it can be seen that the mortality from tuberculosis per 100,000 people of the same age in the United States Registration Area in 1940 was much higher in the later decades of life than among young people. The highest rate in 1940 at any one age period, that of males between 55 and 65, was 110 per 100,000. In 1900 the highest rate for males, 362 per 100,000, was in the younger age period, 35 to 39.

Since the death rate from tuberculosis is still relatively high in persons over fifty, and they form nearly 20 per cent of the population, there must be a very considerable number of elderly tuberculous persons in the country. With a death rate from tuberculosis of 100 per 100,000, there would be about 20,000 deaths from this cause annually, or more than those reported from motor vehicle accidents. Using the very conservative factor of five active cases for every death, the active cases, many of which are spreading infection, may be estimated as at least one hundred thousand.

None of us believe that all of these active cases are in sanatoriums. However, the population of elderly patients admitted to such institutions has been increasing.

At Nopeming Sanatorium,⁸ St. Louis county, Minnesota, there were 91 patients admitted in 1913, none of whom were over fifty years of age. In 1923, over 4 per cent of the patients admitted were over fifty. And in 1933, there were nearly 9 per cent in that age group. In 1943, of 276 tuberculous patients admitted, 56, or more than 20 per cent, were over fifty.

PATHOLOGY

There has been a great deal of controversial discussion regarding the seriousness of tuberculosis in old people. Landis,⁹ Shuman, and Schlesinger² have considered it relatively benign, while Taubert² and others have thought it rapidly progressive.

Rest⁷ reports an analysis of 142 cases admitted to the sanatorium of the Jewish Consumptive Relief Society from 1921 to 1941, all of which were over fifty-five as regards age. One hundred and thirty-five were traceable. Nearly all were admitted in the moderately advanced and far advanced stage of the disease, over 80 per cent being far advanced cases, 18 moderately advanced, and only about 2 per cent minimal cases. Of the group, more than one-half were considered to be predominately destructive or fibro-ulcerative in type and less than half predominately fibrotic.

Interesting comments are made regarding the cases analyzed; only 4 of the patients admitted during the decade 1921 to 1931 were still living in 1941. Two still had cavities in the right upper lobe of the lung, but negative sputum. They had had tuberculosis thirty-eight and fourteen years respectively. The other two had only apical tuberculosis. Their sputum was negative. They had been under observation twenty-two and fifteen years respectively.

Of the group of 63 patients admitted from 1921 to 1931 who had died before 1941, 84 per cent had had sputum containing tubercle bacilli, the duration of their tuberculosis had been from one to five years in 64 per

cent of the cases, ten to twenty years in 15 per cent, thirty to forty years in 5 per cent, and forty to forty-five years in 3 per cent.

Non-tuberculous complications had included cardiovascular-renal disease in 19 per cent, cerebral hemorrhage in 5 per cent, cancer of the rectum in 2 per cent, and bronchopneumonia in 2 per cent of the series.

Of the 37 patients admitted from 1931 to 1941 and still living in 1941, 57 per cent had shown positive sputum. Non-tuberculous complications included, cardiac conditions in 2; renal, 2; diabetes, 1; and bronchial asthma, 1. The duration of the disease had been from two to ten years in 46 per cent of the cases; from ten to twenty years in 29 per cent; twenty to thirty years in 14 per cent; and thirty to forty years in 11 per cent.

Of the 31 patients admitted in 1931 to 1941 who had died by 1941, 4 had died of cardio-renal disease; 2 of coronary thrombosis; 3 of cancer; 1 of leukemia; and 1 of gangrene; the others of tuberculosis. Sixty-five per cent of these had died within three years of the onset of the disease. Four patients had had the disease from three to ten years, and 9 from twenty to thirty years.

The number of tubercle bacilli eliminated and distributed by positive sputum cases that remain positive for periods as long as ten, twenty, thirty, or forty years can only be faintly realized or comprehended, in this respect being comparable only to national expenditures for war and other purposes.

Such cases remaining outside of sanatoriums, form reservoirs of infection from which new cases in younger persons are constantly being derived and they materially help to block the efforts of health authorities to control and wipe out the disease.

Analyses of cases admitted to other sanatoriums show that the types of tuberculosis found there are similar to those just discussed.

At Nopeming Sanatorium⁸ for instance, of 66 patients over fifty years of age admitted in 1943, 26 had far advanced tuberculosis; 16, moderately advanced; 5, minimal lesions; and 3 extrapulmonary disease. In some cases lesions in the bronchial mucosa have been found. No active tuberculosis was found in 10 admitted as suspects. Practically all of the far advanced and moderately advanced cases had mixed exudative and productive lesions, that is, showed both progressive and fibrosing tendencies.

Auerbach and Green¹⁰ report conditions found in 380 autopsies on patients over forty years of age, at Sea View Hospital, a large New York City municipal institution for tuberculosis. The disease was acute in less than 10 per cent of cases, chronic and progressive in nearly all the others. Generalized miliary tuberculosis was a rather common terminal development.

It is not surprising that the patients found in sanatoriums have been for the most part those with active or progressive lesions, and that the types of cases seen in such institutions do not include all present in the community. There is probably a much larger proportion of fibrotic cases with few symptoms in their homes than in sanatoriums. This circumstance makes it difficult to determine the typical characteristics of pulmonary tuberculosis as it affects elderly people.

While undoubtedly considerable numbers of active and progressive cases, both known and unsuspected, are cared

for in homes, a much larger proportion of very chronic cases with latent lesions would be found there if sought. Under the stress of various predisposing causes such cases may become active.

Perhaps the "chronic nodular phthisis" described by Bell¹⁰ is really the type of tuberculosis most characteristic of later life. In it there are many disseminated nodular lesions. Their spread may be very slow and where reparative processes prevail, the necrotic nodules become encapsulated with fibrous tissue. There may be few or no cavities connecting with bronchi and the individual may not be a source of infection for a long period.

Aging tissues are said to be less susceptible to inflammatory processes than growing ones, and to possess a tendency to develop fibrous change. Obliteration of lymphatic channels takes place and involuntional changes occur which render the body resistant to the spread of tuberculosis. There is also on the other hand probably concomitant atrophy, decalcification and dehydration. Calcium about tubercles may be absorbed and bacilli set free. Pinner,¹¹ Sweany,¹² and Rest⁵ have discussed these questions.

In many cases even while the patient is having few symptoms, small or large cavities involving bronchi or bronchioles may originate from nodular lesions and their contents including tubercle bacilli be discharged into the air passages and disseminated.

A few individuals may reach old age without previous infection and develop primary tuberculosis. This cannot always be distinguished from reinfection tuberculosis, either by its clinical course or radiologically.

The tuberculin test is of some value in the diagnosis of tuberculosis in elderly people as Amazon¹³ has shown by studies made at the Brooklyn Hebrew Hospital and Home for the Aged.

Of 519 old people living there, 22 per cent gave negative tuberculin reactions. Some of them had probably never been infected. Others, perhaps as a result of their experience with the disease, had reached an anergic or refractory stage and become desensitized.

Many elderly persons who have definitely recognizable tuberculous lesions with positive sputum and positive tuberculin reaction have still become somewhat immune to the toxic effects of their disease, and make up a highly infectious class. In this group are included the so-called "good chronics" with positive sputum who do not consider themselves ill. Some of them are entrusted with the care of young children or are otherwise in close contact with susceptible persons.

The course of events in any individual case is dependent not only on exposure to fresh infection or on the reactivation of old quiescent foci of the disease under the action of the more common predisposing causes, but also on the endowment of the individual with more or less resistant tissues. According to Max Lurie¹⁴ the resistance of individual rabbits to natural or artificially acquired tuberculosis is a function of their genetic constitution and the sum total of numerous determinants controls hereditary resistance to tuberculosis.

Although tuberculosis may only become manifest and troublesome in later life, its origin usually is to be sought in an earlier period.

DIFFERENTIAL DIAGNOSIS

While, as has been shown, tuberculosis is relatively common in later life, its detection is frequently difficult.

Diseases and conditions likely to cause confusion are met more frequently than. Included among them are cancer, cardiovascular disease, chronic bronchitis, emphysema, bronchiectasis, asthma and silicosis.

If the sputum does not contain tubercle bacilli, the differentiation becomes increasingly difficult. Cough, weakness, loss of weight, hemoptysis and other symptoms found in tuberculosis may be present in many other conditions.

Primary lung cancer often develops insidiously and is especially apt to be mistaken for tuberculosis since the symptomatology of the two diseases is nearly the same. More cases of primary lung cancer are now being accurately diagnosed with the aid of the x-ray and bronchoscopy, especially since the latter resource has come into somewhat general use in sanatoriums and elsewhere. In 1943, more than 250 bronchoscopies were done at Nopeming Sanatorium.⁵ When lung cancer is found early, and proven by biopsy, lobectomy or pneumonectomy may save the life of the patient. The time when this is possible is rapidly passed, and the opportunity may be lost unless the physician is on the alert. Benign bronchial adenomas occur which by their size, may produce pressure in or on bronchi and cause bronchiectasis or atelectasis through obstruction. Bronchoscopy aids in their detection and differentiation.

Beside primary lung tumors, metastasis of malignant tumors may cause confusion. A process in one lung suggesting tuberculosis may in reality be due to secondary seeding from a primary tumor in the other lung. In other cases, numerous small carcinomatous metastases may produce an appearance resembling that of miliary tuberculosis.

Bronchiectasis may be a very chronic condition having its origin in childhood, following whooping cough, measles, or even be in part the result of congenital weakness. In later life it may result from chronic bronchitis, asthma, or other chronic pulmonary disease. Obstruction to bronchi by mucous plugs may cause either atelectasis or dilatation of the bronchi. Similar results may follow external pressure on the bronchi from fibrous tissue, emphysema or enlarged glands. Infection of shut off areas results in abscess formation, cavitation, erosion of blood vessels, and hemoptysis, conditions similar to those found in tuberculosis. X-ray films of lung into which lipiodol has been introduced often show definitely and distinctively the location and relations of such cavities.

Asthma is not an uncommon complication of pulmonary tuberculosis, but asthmatics are not especially predisposed to it. When conditions which cause inadequacy of the right heart are present such as chronic fibrosis of the lungs, cardiac asthma may develop.

Silicosis is a chronic condition which rarely causes distress until after the worker exposed to the dust causing it has spent a number of years in the particular employment responsible for its development. Consequently, the symptoms in many cases do not appear until the patient is over fifty. Shortness of breath may result from gradually developing fibrosis and hemoptysis from ulceration

of blood vessels in infected bronchiectatic cavities. Silicotics become especially susceptible to respiratory infections such as bronchitis and pneumonia, and eventually many of them develop tuberculosis if exposed to it.

More than 50 per cent of the deaths of old people are of cardiovascular origin and certain forms of heart disease are rather readily mistaken for tuberculosis.

Cough with expectoration, dyspnea and hemoptysis, all symptoms of tuberculosis, are common in mitral disease. Hemoptysis is of more frequent occurrence in mitral stenosis than in mitral insufficiency, and characteristic heart failure cells may be found in the sputum, especially in the former condition.

Infarcts resulting from thrombosis and embolism cause airless areas susceptible to infection which eventually may become abscesses or cavities difficult to distinguish from those due to the tubercle bacillus.

Diabetics now form a relatively large percentage of old people since insulin has prolonged their lives. Among their number are a considerable proportion of tuberculous individuals and diabetes has an unfavorable influence upon the course of their tuberculosis. Diabetics who have never shown any signs of tuberculosis may develop it from exposure to infection or from reactivation of latent lesions.

Many cases of tuberculosis in older people are not detected because so few of them have had x-rays of their chest. Most of the surveys have been for children and young people who are much more easily persuaded to cooperate.

Harmon¹⁵ reports the percentages at various ages of those who voluntarily accepted examinations in a certain survey was much smaller in the older age groups, being less than 10 per cent in those over fifty-five.

It has been difficult to secure the consent of older people for examination for various reasons. They pay less attention than young people to declining health, which they feel is to some extent inevitable. Their tired feeling they think is an accompaniment of old age. They do not like to change their environment and are fearful lest if anything be found on examination there may have to be radical changes in their way of living. Inertia and fear of loss of security make them hesitate.

Methods of search for unsuspected or at least undetected cases of tuberculosis, however, are changing. The x-ray, which is our most valuable resource for this purpose, is being used more freely since it is becoming less expensive. The use of microfilms and mobile units has made possible the examination of whole armies and large groups of civilians including all the employees in certain industries.

The development of the area survey in which whole communities are given the opportunity of securing x-rays at little or no expense is bringing cooperation hitherto deemed impossible. Davies⁸ reports that in the mobile unit survey recently completed at Ely, Minnesota, a town of over 5,000 population, more than 98 per cent of the population was x-rayed.

Another hopeful development is the growing practice in hospitals of having x-rays of the chest taken of all patients admitted, whatever the diagnosis.

Soon the taking of an inexpensive x-ray of the chest will be part of the routine examination of all patients seen by physicians in their offices.

With such resources, the detection of unsuspected tuberculosis in elderly persons will become much simplified.

TREATMENT

The treatment of tuberculosis in old people is in many respects the same as it is for those in early life.

Rest of the inflamed area is the keynote of the successful handling of a case and will probably be necessary even if some effective form of chemotherapy is found.

Certain difficulties in the application of strict rest treatment to elderly patients are apparent. Complete immobilization is not well borne by the aged for any length of time, and mechanical measures to secure lung rest are less applicable for them. However, not all patients are as old as their years, and pneumothorax and other forms of collapse therapy may be used in selected cases.¹⁶ With good heart function and other evidence of vitality, necessary operations are well borne by relatively old people and thoracic operations may be indicated for some.¹⁷ There is less shock connected with the induction of an extrapleural pneumothorax than with thoracoplasty, and improved methods of anesthesia have lessened the risks involved in the latter.¹⁸ Symptomatic treatment and good nursing obtainable at the sanatorium may bring good results where mechanical adjuncts to bed rest are not advisable.

The importance of generous provision of sanatorium beds for the most modern treatment, care and nursing of active cases, and for the prolonged stay of infectious cases, whether acutely ill or not, cannot be too highly emphasized. Provision should also be made for securing the segregation, rehabilitation, employment so far as possible, and contentment and happiness of the "good chronic" with positive sputum where he will not continue to spread the disease and prevent its control.

Exceptional cases will doubtless have to remain at home. The physician should, however, not accede to such a plan without a full realization of the risks involved, and the possibility of infecting an entire family.

Persons of all ages with thoroughly arrested tuberculosis who have no active lesions and who do not disseminate tubercle bacilli should, like other people, be under good medical supervision. They are said to form perhaps 15 per cent of the population, and should in general be treated like the rest of us.

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THE FIELD FOR MEDICAL JOURNAL SYMPOSIA

This symposium covers some of the important current geriatric problems greatly influencing medical practice.

Geriatric Medicine, edited by Stieglitz,¹ is a brilliant compilation by 54 contributors and 46 assembled chapters. Such a work is encyclopedic (887 pages) and were it in most physicians' hands it would, for a time, make such special editions as this superfluous. Thewlis'² book is likewise complete, attractive, informative and full of wisdom. Cowdry's³ compilation will long endure. Several chapters are delightful, literary essays* bringing the broad background of biological and chemical and psychological research to bear upon the elusive life transformation we call *age*.

Despite all that has been written in books I make a strong appeal for our medical journal and periodicals. Most of our books spring from studies and recorded ob-

* (the chapter by the late Lewellys Franklin Barker is a philosophical masterpiece.)

servations of those first presenting their material to medical groups or societies and later recording it in the journal of their preference or the organ of the society before which it was read.

There is a definite transition to be traced between formal text books and published or personal file data accumulated by all doctors contributing to medical literature. The yearly reviews and progress series are admirable assemblages, particularly for those men lacking access to larger libraries. Text books (so-called) connote by appellation "text" students' manuals. As such they are apt to follow the "compound" formula, or become too burdensome or effusive for the overstressed medical student. Complete medical and surgical treatises become most useful *reference* sources but they run into multiple volumes and are too expensive for wide distribution; the momentum of medicine ushers in early obsolescence; the clinicians get out of the habit of using them because they find in them *restatements* of that which is known to

them already, and in current journals they find new and ingenious keys that help them to understand and treat immediate, puzzling and baffling ailments. In other words we do not push into the battle with disease along any wide front but rather in limited salients, from which lateral projections may cut off the enemy.

For example the discovery that storage material in the liver "cures pernicious anemia" gave great impetus to an understanding of nutritional disorders in general. If penicillin (or its successors) come to control many infections then the medical profession may have time to attend the physiological perversions of which the most prevalent are the psychoneuroses.

Viewed from still another angle our profession is doomed to suffer from the acclaim that accrues to an individual sick person by the newspaper reporting of some new and daring procedure; and to endure contempt and calumny by the great preventers who ask that humanity be treated *en masse*. On the other hand, no one is too sick to be cured miraculously; none may have disorders that some sort of wholesale "shots" will not banish!

Geriatrics illustrates as does no other medical approach that aging itself cannot be prevented as can smallpox, malaria or tuberculosis. Each individual combines that familial, environmental, occupational, dietetic and habit ensemble with which he has battled for efficiency and adjustment in a turbulent society. God didn't make him just like anybody else. It is your duty and opportunity to help him adjust to life in ways comparable to the attainment of skill and proficiency by artisans—not to say artists. The JOURNAL-LANCET aims in this issue to outline for you some of the technics.

E. L. T.

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THE PENALTIES OF AGING

When organized life ceased becoming unicellular the privilege of immortality for organisms was surrendered. Only the single cell that divides into two independent but single celled individuals can achieve in this manner a biologically endless existence.

The biological factors that determine aging of the individual have escaped critical analysis. The experimental biologist has been able to accelerate the accompaniments of senescence, as for instance in the arteries of the rabbit by increasing the lipids in the blood stream, but the converse effect of retardation of the process of senescence has not been accomplished.

An interesting exception to this statement might be cited in the results of tissue culture as carried on by Carrel and Ebeling. Here, however, artificial methods renew and change the environment and the tissue culture assumes the characteristics of a colony of unicellular organisms. In the process nothing corresponding to a corpse is left behind.

The organic pattern of higher forms of life involves a soma and a germ cell. The ovum fertilized by the sperm cell of another individual of the species produces a soma and more germ cells; but the soma eventually dies. Only the germ cell which produces a new soma may be said to

carry on the torch of organic immortality.

The inevitability of death of the soma is axiomatic. Paleontology and anthropology reveal that not only individuals but races and cultures are conceived, develop and grow, achieve first adulthood then senescence and die.

C. S. Minot, the embryologist, long since has pointed out that the first evidences of aging in cells of the body may be found in the epithelia of the embryo before birth.

Viewed biologically, as related to environment, death of the individual is a necessary corollary to life. How much room would there be for the present population of the world if the original pair and all their descendants were still alive? Perish the thought! Proponents of the need for war as a means of procuring "lebensraum" might then conceivably have some justification for their attitude and for the artificial destructiveness of war to achieve their ends!

Man's longing for immortality will not let him rest, however, and the story of the search for means of prolonging life is as old as history. The progress achieved during the past two generations involves steps principally in the prevention of infant mortality and of death from accidental causes; mechanical and infectious.

The maladies and discomforts of senescence have interested physicians from Hippocrates on, and growing interest is manifest as the group over 65 years of age has increased. Means of retarding the regressive changes of senescence have not been established even with our newer knowledge of hormones and vitamins, but much has been accomplished in retarding and avoiding many accidents and concomitants of the regressive processes and the physical, mental and emotional discomforts of the period.

That the problems of nutrition are of importance goes without saying. As individuals recede from the farm and congregate in the city, and as the soil on the farm is depleted by human use and abuse, the problems of nutrition increase. In addition, the processing and storage of food have resulted in diminished vitamin content, for which well coordinated compensation has not as yet been provided. Our population is spending incalculable millions of dollars in a frantic and ill directed effort to secure the vitamins they think they need, and are encouraged by the unprecedented and sordid and misleading advertising of certain business houses.

The problems of dentistry add to the handicaps suffered by the aging body, and add measurably to the difficulty of proper nutrition in the aged. If all that we know in this field could be applied, we would have taken a long step in the prevention of the disorders of and the loss of teeth apparent in our population.

Facts concerning regressive processes in the blood vessels of species of animals other than man do not reveal a necessary relationship to senescence and death. It is probable that viewed teleologically other adverse conditions are sufficient for the purpose. In man, however, arteriosclerotic and atherosclerotic changes provide important mechanisms by which individuals surviving the accidents of life may be removed from the living scene. Ulrich has outlined the story of cardiovascular deterioration in this number of the JOURNAL-LANCET.

We may not be able to reverse the processes of aging of colloids and collagen, the dehydration of tissues and

of cells, or of arteriosclerosis, but we can improve our dentures, natural as well as artificial. We may ameliorate many of the effects of organ damage produced by arteriosclerosis and we can lessen measurably the physical, mental and emotional discomforts of the senescent period.

Since man is what he is, it is certain that the most significant and the most important factors in his comfort and well being lie in this latter field. Palmer's article in the current issue has great value for the reader.

The true physician has a function much larger than that of mere correctionist. A serene old age, equanimity based on an ego at peace with its author, is an ideal for which all may strive.

S.M.W.

GERONTOLOGY— A THREAT OR A PROMISE?

Geriatrics, the study of the diseases of old age, would seem now at long last to be on its way as a specialty of modern medicine. But gerontology, the study of old age as such, is still scarcely a budding science. Statisticians claim that by the end of this century the majority of Americans will be over fifty years of age. This is almost a terrifying thought. By that time it is more than conceivable that medicine will have obliterated most of the arteriosclerosis, the cancer, the arthritis as well as the minor ailments that plague old age, and Sir James Crichton-Browne's counsel back in 1891 that doctors live to be one hundred and make their patients do the same, will be accepted common sense. Everybody then can look forward with more or less confidence to a painless old age. But unless gerontology has proved by then that the mind will remain as ripe as the body the achievements of geriatrics will be "Like to the apples on the Dead Sea's shore, All ashes to the taste."

The truth is that we know almost nothing about the psychology of the aged. What actually is full maturity? How is physiological related to mental age? Nobody knows. How explain Titian and Michael Angelo painting their greatest masterpieces in their eighties, Harvey discovering the circulation of the blood at seventy-two, the wise admonition of James Bryce at eighty-four, the brilliancy of Chief Justice Holmes' mind in the nineties? History present and past is crowded with the names of brilliant ancients but no one has even tried to evaluate their mental prowess. No, psychology has scarcely scratched the surface of the aged. The intelligence tests are here of little value since their usefulness fades with the teens, and the Freudians, refusing to psychoanalyze anyone over forty, are of no help whatever.

There is some evidence, although not enough, that there exists a definite connection between mental activity and longevity. If that is so it is not only possible but probable that by learning how to add to our span of years we shall find that our old men and women have social functions in our modern world hitherto unused; that by their capacity for long-range, objective thinking, their ability to synthesize experience into wisdom they possess the very qualities of statesmanship and leadership so lacking in the distracted world today.

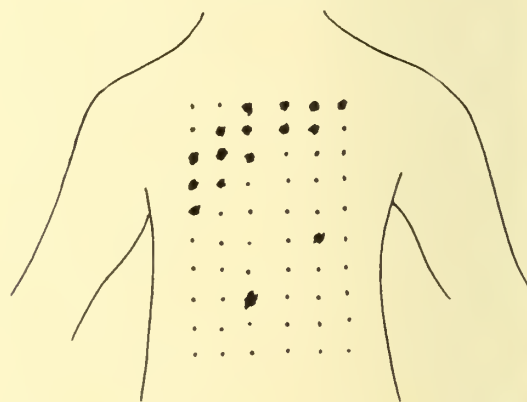
In America from our beginnings we have placed a premium on youth and after this war youth's stock is bound to sky-rocket higher than ever before; but it looks as if

tomorrow we shall need more than the high courage and capacity for sacrifice youth has contributed so magnificently, something beyond its inexperience and short-sightedness to deliver. Is it possible that we shall find that Stanley Hall was right when he said that "ripe old age has been a slow, late, precarious, but precious acquisition of the race, perhaps not only its latest but also its highest product?" Or is that mere wishful thinking? We shall not know the answer until gerontology has advanced much farther than it has today.

M. U.

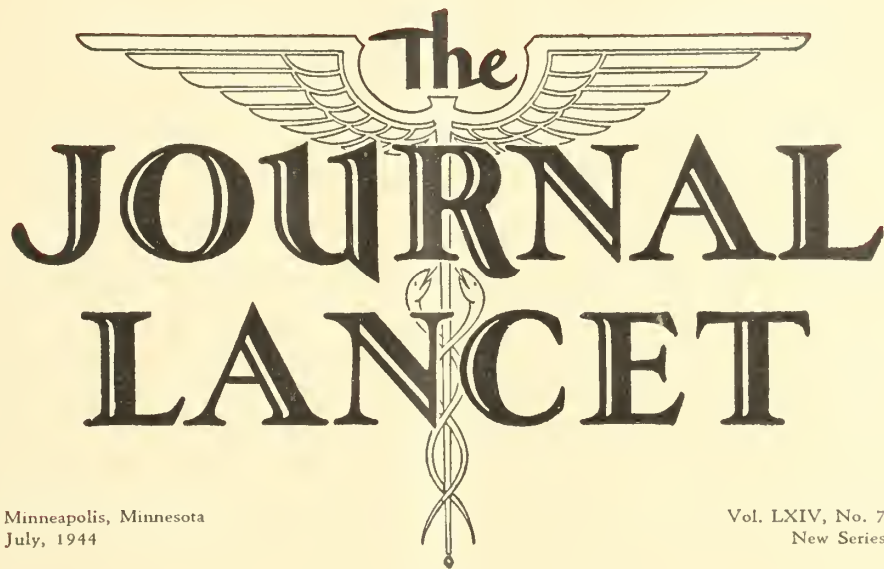
We are embarrassed. We may as well confess that we underestimated both the interest in geriatrics and the generous support of our guest editor. Dr. Touhy's contagious enthusiasm brought to our office the nine excellent papers of this issue. And he and we liked every one of them. Here was truly a dilemma. We had already agreed to make this the biggest issue of our history, but there are limits,—paper and so on. Should we have to discard the two papers that would bring us within bounds? (Believe it or not, Mr. Ripley, we had actually sacrificed some advertising.) Or should we postpone for a time the other departments—News Items, Book Reviews, American Student Health Association News-Digest, Future Meetings? It hurt, but we decided in favor of the articles. After all, this is a symposium that concerns not only every practitioner as such, but also everyone of us as a human being. We hope you will agree that we chose wisely.

OMISSION



An Illustration of the Grouping of Positive Cutaneous Reactions in a Localized Area of Hypersensitivity.

This illustration was inadvertently left out of the Special Pediatric Number of JOURNAL-LANCET (May 1944) and is referred to in the paper "New Interpretations of the Allergy Cutaneous Tests," by Albert V. Stoesser, M.D., in the next-to-last paragraph preceding the summary, top of page 147. The illustration will appear in the reprints of the article.



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EDITORS' FOREWORD

THE contents of this symposial issue on poliomyelitis represent contributions to the Management of Infantile Paralysis Course for Physicians at the University of Minnesota, Department of Postgraduate Medical Education. These papers, among others, were presented during the week of June 19, 1944. It is the hope of the editors that this special issue of the JOURNAL-LANCET may serve a useful purpose in providing physicians with summaries of the most authoritative information available concerning this disease at a time when its incidence is likely to be increasing toward the usual summer peak.

Dr. Kenneth F. Maxcy is Professor of Epidemiology in the Johns Hopkins University School of Hygiene and Public Health, and is Director of the Infantile Paralysis Investigation Unit at that institution. Dr. A. B. Baker is Associate Professor of Neurology and Psychiatry at the University of Minnesota. Dr. A. L. Watkins is in charge of physical therapy at the Massachusetts General Hospital. Dr. E. Gellhorn is Professor of Neurophysiology at the University of Minnesota and is in charge of neurophysiological investigations in the Infantile Paralysis Research Unit at that institution. Dr. H. G. Wood is Associate Professor of Physiological Chemistry at the University of Minnesota. Dr. B. Campbell is Assistant Professor of Neuroanatomy at the same institution. Each of the latter two is in charge of investigations in his special field in the poliomyelitis problem.

A Review of the Epidemiology of Acute Anterior Poliomyelitis with Reference to the Mode of Transmission*

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Baltimore, Maryland

THE ultimate objective of investigating poliomyelitis is to reduce or completely remove the risk of paralysis or death from this disease. It may be achieved by either or both of two approaches. First, it may be possible to reduce or entirely prevent exposure of human beings to this infection. Second, granting that this can not be adequately accomplished, it may be possible to confer an increased resistance so that the virus, having gained access to the body, is unable to disseminate along nerve pathways and destroy nerve cells. Achievements short of this objective are palliative—necessary and urgent though it be at the present moment to learn as much as possible about methods of restoring function rapidly and completely in patients who have suffered paralysis.

In the discussion which is to follow, attention will be limited to the first approach, that is, to a consideration of the possibility of reducing or preventing exposure to infection. Prerequisite is knowledge of how the virus maintains itself in nature and under what circumstances human beings acquire the disease. It does not necessarily follow that if this knowledge is realized dissemination of the virus among human populations can be effectively blocked by public health measures, but certainly this is the first step. It is proposed to review, therefore, what is known of the epidemiology of poliomyelitis with especial reference to its modes of transmission. Any explanation of how the disease spreads must be consistent with all of the facts which have been established with regard to its behavior.

Time does not permit a systematic review of the epidemiological literature. Present day conceptions rest in large part upon the observations made in Norway and Sweden toward the end of the 19th, and during the early part of this century, which are available in the classical monograph of Ivan Wickman, published in English translation in 1913.¹ Systematic studies in the United States began with the reports of Dr. Charles S. Caverley upon the occurrence of anterior poliomyelitis in the state of Vermont in 1894.² As a result of the epidemic of 1907 in New York, Flexner and Lewis began their experimental investigations. Following the extensive prevalence of the disease in Minnesota and Nebraska in 1910, W. H. Frost made a comprehensive investigation of its occurrence in Iowa during the following year, and extended his observations to the outbreak in Cincinnati, Ohio, in 1911, and in Buffalo and Batavia, New York, in 1912.³ The largest epidemic this country has experi-

enced centered about New York City in 1916. This was studied in great detail by three officers of the United States Public Health Service, C. H. Lavinder, A. W. Freeman and W. H. Frost.⁴ Their report contains the most complete discussion of the epidemiology of this disease which is available. Since its publication there have been a large number of contributions from investigators in this country and abroad which have served to confirm, amplify and extend the basic observations, although the net advance has been relatively small.^{5,6}

For the broad general epidemiological characteristics of poliomyelitis, principal dependence must be placed upon the analysis of the reports of cases and deaths made routinely to official health organizations. These have become available only during the last quarter-century. Their completeness and accuracy have been improving during this period. The "geographic area and populations represented" has been constantly extending, but is still fragmentary. Accordingly, statistical analysis of morbidity and mortality figures are subject to many limitations and must be interpreted with great care. This point is stressed because it has not been fully appreciated by many authors. It is vividly illustrated in some of its applications by a study recently made of the reporting of paralytic poliomyelitis in Massachusetts from 1928 to 1941, by Dr. Norman B. Nelson.⁷

It has been established generally that the degree to which mild, abortive, non-paralytic infections with the virus of poliomyelitis was recognized and reported has varied and rendered uncertain comparisons of the incidence of the disease in different periods of time for the same area (trend), and for different areas. Dr. Nelson limited his study to cases which had definite and characteristic paralysis. During the last 13 years 2,363 persons with the paralytic form of anterior poliomyelitis have registered at the Harvard Infantile Paralysis Commission. It was possible to check the names of these persons against the names of cases reported by physicians to the State Board of Health. Dr. Nelson found (1) that 56 children came to the clinic with paralysis but with no history of any acute illness that could have been reported to the health department; (2) that besides this group there were 524 cases of paralytic poliomyelitis which were not reported or an over-all rate of failure to report of 23.1 per cent, or approximately one-fourth of the total known paralytic cases. This would not be particularly disturbing if the three-fourths of cases which were reported were an unbiased and representative sample of the total, but it was found not to be so.

The incompleteness of reporting was disturbed by many factors. Thus the percentage of paralytic cases

*Read at the Management of Infantile Paralysis Course for Physicians, Center for Continuation Study, University of Minnesota, Minneapolis, June 19, 1944.

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not reported was 17.7 during epidemic years, 27.3 during years of moderate prevalence, and 31.2 during non-epidemic years. This tends to minimize the endemic frequency of occurrence. In relation to season, the deficiency was only 13 per cent in August, which is usually the peak month, but 68 per cent from January through May, when poliomyelitis is not expected to occur. This tends to exaggerate the summer rise. While in the cities the percentage *unreported* was only about 22, it was twice as great in the small towns and country districts. This has the effect of increasing the urban in comparison with the rural rate. In relation to age, 56 per cent of the cases in infants (under 1 year), 30 per cent of the cases in pre-school children (1 to 4 years), 17 per cent of the cases in school children, and 29 per cent of the cases in adults (16 years and over) were not reported. This would tend to give a higher age selection for this disease than is actually so.

When cognizance of such findings is taken, it is evident that great caution should be exercised in interpreting the morbidity reports from whatever source. Errors of a similar character but of smaller magnitude enter into mortality statistics. The errors of both affect the attempts to calculate case-fatality rates under different conditions.

Reviewing available morbidity and mortality data with these considerations in mind, the following brief interpretations regarding broad general characteristics appear to be valid:

(1) *The disease is world-wide in distribution.* Wherever human populations have come under medical observation, sooner or later individuals showing typical paralysis have been found. Outbreaks have been reported from most of the countries where organized medical facilities exist, ranging from Iceland and Greenland in the Arctic region to El Salvador and New Guinea close to the Equator. Whether in long periods of time the greater proportion of the population suffering paralysis from this cause in temperate as compared with tropical climates is real or only apparent, is still a matter of speculation owing to the lack of dependable quantitative data which would permit comparison. The apparent differences may be largely due to the fact that in tropical countries the disease prevails more uniformly throughout the year and is therefore less conspicuous than it is in the colder countries in which it tends to manifest itself in epidemics.

(2) *From no human community is the disease long absent.* The occasional occurrence of a case of paralytic poliomyelitis is evidence of more or less continuous propagation of the virus at a low level.

(3) *Transmission can occur in any month of the year.* In geographic areas where there is a large seasonal variation in temperature, incidence is increased during the warmer months of the year, but it is somewhat misleading to refer to poliomyelitis as a "summer" disease. Epidemics usually occur during the summer and fall, but many begin in the early spring or last into the late winter.

(4) *The disease exhibits an irregular inter-annual periodicity in prevalence.* In any given region after a series of years during which the incidence has fluctuated at a low level, a year may be expected, though not surely predicted, during which it will attain an unusually rapid dissemination over a short period of time. These epidemics may be limited to a small locality, but be regional in character. In the United States, in addition to scattered areas of high prevalence, one or more regional epidemics develop during the summer in almost every year. Usually, but not always, the highest attack rate is registered in the population of the original focus of the regional wave.

(5) *From an original focus the spread is progressive in unpredictable directions.* It moves along lines of communication

from one community to another at a pace that has not changed materially during the past half-century in spite of the increasing volume and speed of travel. This may be explained by the consideration that the principal determining factors in its slow movement are the nature of the contact required for transmission and the length of the incubation period which in poliomyelitis is 7 to 18 days. The epidemic wave usually diminishes with the advent of cold weather but may sometimes continue at a low level of incidence during the winter months and begin to increase in the same area in the following spring to continue its course.

(6) *It has no regular pattern as regards rural and urban distribution, if long time periods are considered.* To say that it is a "rural" disease is hardly justified by the available facts. It has been conspicuously prevalent in epidemic form in rural areas during recent years, but there also have been epidemics in urban areas. That the total incidence of infantile paralysis is greater among children growing up in a rural environment as compared with those growing up in an urban environment has not been demonstrated.

(7) *Poliomyelitis is characteristically a disease of early childhood.* The extent to which the higher age groups are attacked varies with time and place. It has been stated that the age incidence has undergone a fundamental change within the past 20 years, with an increase in the proportion attacked at older ages. Whether this is real or only apparent is open to question. There are concealed fallacies which may play a role. The changing age composition of the population in the United States, the more accurate diagnosis of the disease, the inclusion of abortive forms, and the selective character of under-reporting, all are factors that must be taken into consideration.

(8) *Immunity to attack is acquired with advancing age.* The proportion of adults who have paralytic poliomyelitis, but under ordinary circumstances is relatively small. This relative freedom of adults is not correlated with the history of a previous recognized attack of the disease. In a communicable disease study conducted by the U. S. Public Health Service of 80 cities with 100,000 or more populations, a total of 693,084 white persons of all ages was canvassed. Only 6.38 persons out of every 1,000 between the ages of 20 and 23, gave a history of having had the paralytic form of poliomyelitis at any time in their prior life.⁸

(9) *The total number of cases manifesting characteristic paralysis during an epidemic period rarely exceeds 2 per 1,000 population of all ages.* More commonly the total attack rate based upon reported paralytic cases, when an epidemic has run its course, is in the neighborhood of 0.5 per 1,000. The rate may occasionally be greater in small outbreaks, especially those involving communities such as institutions and camps in which the population at risk is largely composed of children.

(10) *The number of individuals infected with the virus of poliomyelitis is far greater than is indicated by an attack rate based upon reported paralytic cases alone.* Various estimates have been made of the ratio between paralytic and non-paralytic or abortive attacks. The evidence suggests that it varies in different epidemics and in different geographic areas. Estimates must remain uncertain and indefinite until a readily applied laboratory test becomes available which will permit certain diagnosis of infections presenting vague symptomatology. In addition to those who are sick, it long has been known that some individuals may harbor the virus without apparent illness. How common these "carriers" or individuals suffering from an inapparent or subclinical infection are, is still a matter of speculation rather than of exact knowledge. If the immunity developing with age is due to specific antigenic contact, then the unrecognized, subclinical and inapparent infections with the virus of poliomyelitis must far outnumber the recognized paralytic and non-paralytic attacks.

(11) *A considerable proportion of cases has had recent direct or indirect contact with a previous paralytic or non-paralytic, known or suspected case in the acute or convalescent stage.* Estimates of the frequency of a history of contact vary with the definitions adopted and the circumstances under which the investigations are conducted. It is not unusual to find that such a history can be established in 15 to 25 per cent of instances. In sparsely settled and remote rural communities where contacts are few and relatively infrequent, chains of transmission

from person to person are sometimes apparent. It is evident, however, that a history of contact with a preceding recognized clinical attack of poliomyelitis frequently can not be established. The disease seldom paralyzes more than one child in a family, but if non-paralytic and abortive attacks be considered, multiple cases are not unusual. For example, Swartout and Frank⁹ found that 9.29 per cent of 721 patients admitted to the Contagious Disease Unit of the Los Angeles County General Hospital in 1943 came from families with multiple cases recognized by clinical examination.

To illustrate the behavior of poliomyelitis in local outbreaks, a brief account will be given of two. The first is one that centered about Atlanta, Georgia, in 1941,¹⁰ investigated by my colleagues, Dr. Ross Gauld and Dr. John Phair. The second is a small rural focus in New York State in 1940, investigated by Dr. Alexander Langmuir and Dr. G. Y. McClure.¹¹

From 31 counties lying within a radius of 60 to 70 miles of Atlanta, some 417 cases of poliomyelitis were reported to the local health authorities between June 1st and September 20th, 1941. With very few exceptions the reported cases were paralytic. The homes of 383 were visited and data recorded with respect to the patient, contacts and environment.

Within this area, shown on the map, the disease made its appearance at approximately the same time at three widely separated points. These were in Atlanta (Fulton County) on June 4th, in Lawrenceville (Gwinnett Coun-

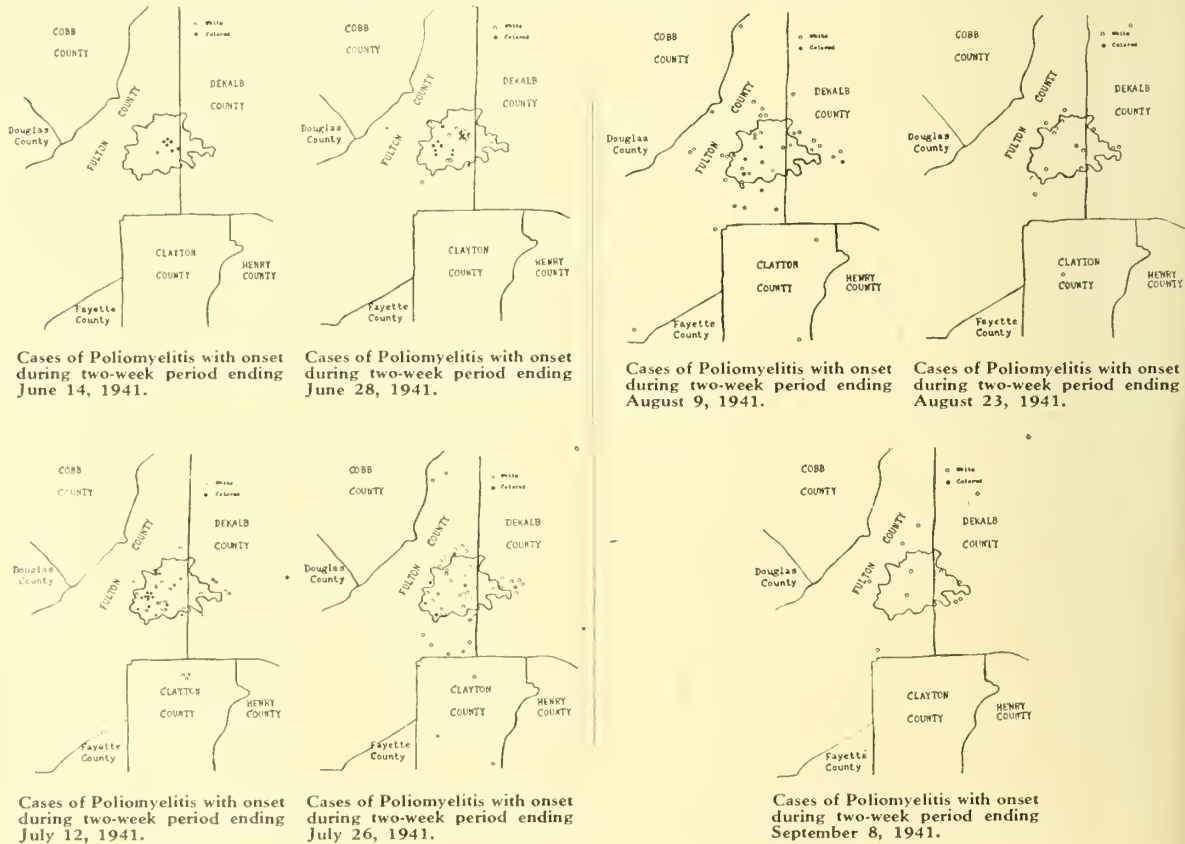
ty) on June 5th, and in Thomaston (Upson County) on June 16th. No relationship could be established between these three foci. The latter two were typical rural towns, and the number of cases in and around them was too small to illustrate the pattern of spread. Attention is therefore directed to the City of Atlanta.

The course of the epidemic in the whole area is represented graphically in a series of seven maps showing the reported cases for each two-week period between June 4th and September 8th. The epidemic reached a peak and faded out, although the daily temperatures were still those of the summer season.

In Atlanta the total attack rate based upon reported cases for the whole period was practically the same for white and colored, 0.34 and 0.36 per 1,000 population, respectively.

About one-third of the population of Atlanta is colored. Local custom has established the areas and locations in which they live, and, to a certain degree, their intermingling with the whites. However, if they were equally exposed to a contaminated common water supply or a common milk supply, it would be expected that cases would occur in the two races at approximately the same time. The course of the epidemic in relation to dates of onset has been studied, for the colored, and for the white race in Atlanta, and for both races in the adjacent suburban area of Fulton, DeKalb and Clayton Counties.

ATLANTA, GEORGIA, AND SURROUNDING DISTRICT



It is interesting to note that the onset of the median case for the colored urban group was June 26, for the white urban group was July 18, and for the white and colored suburban group was July 28th, and that there was no simultaneous aggregation of onsets in the three groups which would suggest the distribution of the infection by a common medium. The cases were scattered along the time axis. In Atlanta the epidemic began in, and disappeared from, the colored population before it did in the white. The outbreak in the suburbs followed that in the city.

The disease showed no tendency to focalize in certain sections of Atlanta, nor to select the less sanitary parts of the city. It was possible to obtain the population in the eight zones shown in the map, and to calculate the attack rate for each, shown in Table 1. Within the limits

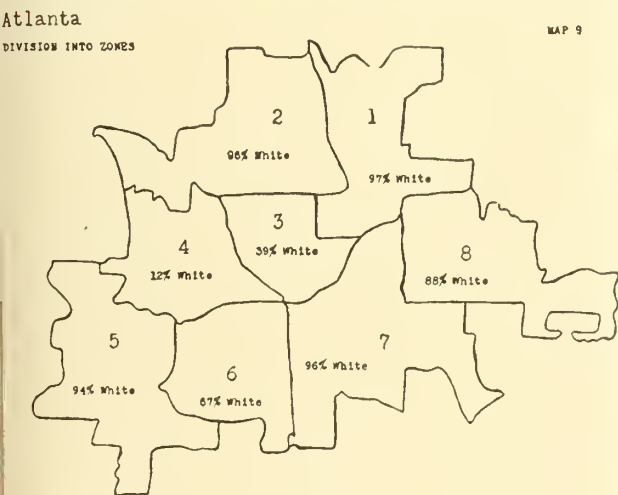


TABLE 1
Population, Cases of Poliomyelitis, and Case Rates for 8 Zones of Atlanta, by Color

Zone	WHITE			COLORED			Pct. Colored
	Population	No. Cases	Rate per 100,000	Population	No. Cases	Rate per 100,000	
1	32,074	5	15.2	890	1	112.0	3
2	40,791	13	31.9	2,743	2	73.0	6
3	12,933	6	46.4	29,195	12	41.0	61
4	5,131	2	39.0	35,918	14	39.0	88
5	29,555	13	44.0	2,021	2	99.0	6
6	27,450	13	47.4	25,542	5	19.5	43
7	35,268	12	34.0	1,470	1	68.0	4
8	18,793	4	21.3	2,514	0		12
			34.3			35.5	

of sampling variation, all parts of the city were affected in about the same manner, and irrespective of social and economic status.

The age selection is shown in Table 2. The concentration of cases in the younger age group was greater among the colored than the white and greater among the white who were rated as Fair or Poor in regard to household cleanliness (Table 3). The reason for this difference is not immediately apparent. It is also interesting to note that the 68 white cases in Atlanta were divided equally between the group whose household cleanliness was rated as Good and that rated as Fair or Poor.

In Table 4 is summarized the result of trying to trace the source of infection of 360 reported cases to direct or

indirect contact with a previous case or suspected case, or a third person who might have suffered an inapparent infection. The experience presented is perhaps an average one, when investigations of this kind are conducted in a thickly populated area.

TABLE 2
Poliomyelitis Cases by Residence, Color and Age

		AGE GROUPS			Total
		0-4	5-9	10+	
FREQUENCY DISTRIBUTION					
Atlanta	White	34	21	13	68
	Colored	33	4	0	37
Outside Atlanta	White	129	51	54	234
	Colored	34	4	9	47
PERCENTAGE DISTRIBUTION					
Atlanta	White	50	31	19	100
	Colored	89	11		100
Outside Atlanta	White	55	22	23	100
	Colored	72	8	20	100

TABLE 3
White Cases of Poliomyelitis in Atlanta According to Household Cleanliness, by Age

Household Cleanliness	AGE GROUPS			Total
	0-4	5-9	10+	
FREQUENCY DISTRIBUTION				
Very good	12	13	9	34
Fair or poor	22	8	4	34
PERCENTAGE DISTRIBUTION				
Very good	35	38	27	100
Fair or poor	65	23	12	100

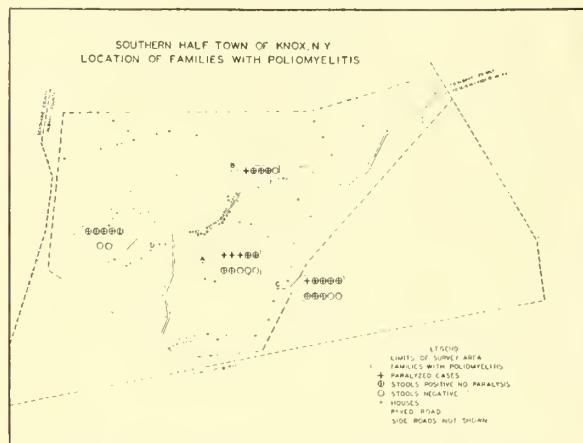
TABLE 4
Contact History of 360 Reported Cases Investigated in Atlanta and Study Area

	Pct. of Total
Reported Cases—Atlanta	
Direct contact with a previous case	7
Direct contact with a suspicious case	5
Contact with a household associate of a case	1
Lived near previous case or cases (no contact history)	10
Probable contact through Grady Hospital clinics	8
No contact as specified above	72
	103
Reported Cases—Outside Atlanta	
Direct contact with a previous case	18
Direct contact with a suspicious case	12
Contact with a household associate of a case	2
Lived near previous case or cases (no contact history)	14
	46
Visited Atlanta (epidemic area)	
Contact with visitors from Atlanta:	
Adults	16
Children	1
Adults and children	1
Adults in same household visited Atlanta	42
Children in same household visited Atlanta	2
No association with Atlanta but parents' work is such that they are in contact daily with persons from Atlanta	17
Contact history negative	87
	257

Laboratory investigations made upon material collected during the outbreak reported by Langmuir and McClure indicate the distribution of the causative virus among the sick and well contacts of paralytic cases.

Four children in the town of Knox, a rural area in Albany County, New York, became ill with severe paralytic poliomyelitis on the same day, September 10, 1940.

A fifth similar case developed in the following day. No case of poliomyelitis had been reported previously in this sparsely populated community since 1922. Investigation revealed the facts represented in the map. The outbreak involved four families, A, B, C and D. Three of these, A, B and D, were intimately associated. Families A and B, in which 4 of the 5 paralytic cases occurred, are re-



lated. Families A and B held a joint party eight days prior to the outbreak on the farm of A. Two days before their onset, the younger children from A's farm visited, over the weekend, with the B family and the D family. Family C was acquainted but not closely associated with the other three families. However, nine days prior to the onset of one paralytic case in family C, the patient was exposed at a large family party to a number of relatives from Schenectady and Rotterdam, where poliomyelitis was prevalent.

The virus of poliomyelitis was demonstrated in fecal specimens from 4 of the 5 paralytic cases, and from 20 of the 27 intimate contacts. Of this latter group, 13 gave a history of illness within the ten-day period immediately following the outbreak, 14 remained well. Of the 13 with illness, 10 had positive stools and might therefore be classed as cases of abortive poliomyelitis. Of the 14 without history of illness, 10 had positive stools and were therefore instances of inapparent infection. Although the explosiveness of the outbreak suggests a common source of infection, none was discovered. To be sure, three of the families, A, B and D, were intimately associated but all the members of these three households were not known to have been together at any one time, nor was it found that they all partook of the same water, food or milk at any time. None of the members of family C had visited at any of the other three farms for several months prior to the outbreak.

House flies were present in abundance throughout the area. However, the location of the four families on isolated farms, surrounding but not within the relatively concentrated area of the hamlet, does not favor an insect vector, although this possibility can not be entirely ruled out. Consequently, personal contact among intimate friends and members of each family is the most adequate explanation for the known infections within the community. The high proportion of individuals shown

to harbor the virus must have offered many opportunities for spread from person to person, both among children and adults. But the finding of virus in the feces by no means implies that the disease was transmitted by water, milk or food contaminated with such discharges.

The interpretation which seems most consistent with the facts and observations which have been presented up to this point may be briefly summarized as stated by Lavinder, Freeman and Frost in 1916:⁴

"1. That poliomyelitis is, in nature, exclusively a human infection, transmitted from person to person without the necessary intervention of a lower animal or insect host, the precise mechanism of transmission and avenues of infection being undetermined.

"2. That the infection is far more prevalent than is apparent from the incidence of clinically recognized cases, since a large majority of persons infected became 'carriers' without clinical manifestations, (i. e., have had inapparent infections). It is probable that during an epidemic such as that in New York City a very considerable proportion of the population becomes infected, adults as well as children.

"3. That the most important agencies in disseminating the infection are the unrecognized carriers and perhaps mild abortive cases ordinarily escaping recognition. It is fairly certain that the frank, paralytic cases are a relatively minor factor in the spread of infection.

"4. That an epidemic of one to three recognized (i. e., paralytic) cases per thousand, or even less, immunizes the general population to such an extent that the epidemic declines spontaneously, due to the exhaustion or thinning out of infectible material. Apparently an epidemic incidence relatively small in comparison to that prevailing in an epidemic may produce a population immunity sufficient to definitely limit the incidence rate in a subsequent epidemic."

Attention is now directed to the present status of knowledge as to the precise mechanism of transmission and avenues of infection. Studies of the pathogenesis of poliomyelitis^{12,13} have indicated that the virus of poliomyelitis enters the body of an exposed individual through either the nose or the mouth or both. The tissue of primary proliferation is not established with certainty. During life the virus can be recovered early in the disease from the mucous membrane of the oropharynx¹⁴ and tonsillar region, and postmortem from the mucous membrane of lower portions of the alimentary canal. Accordingly, it may leave the body with secretions from the oropharynx and does leave with fecal excretions. To state the problem of transmission more succinctly, it is uncertain whether the effective exit of the parasitic virus is via oropharyngeal secretions or by feces or by both. Putting the question in different words, it is uncertain whether the virus of poliomyelitis is transmitted by the kind of person-to-person contact which is required for the passage of such infections as chickenpox, measles, or mumps, or by the kind of contact required for the transmission of such infections as cholera, typhoid fever or bacillary dysentery, or by both kinds of contact. It is proposed first to examine the latter hypothesis, that is, that it is a fecal-borne disease.

It has now been demonstrated by a large number of investigators that the virus of infantile paralysis is excreted in the feces of an infected human being for a variable period of time. With the laboratory technics now available, 50 per cent or more of the examinations of stools from patients obtained during the acute illness is found to be positive for the virus. The proportion of successes decreases during the first two or three weeks of convalescence quite rapidly and reaches a low figure about the eighth week. Occasionally the virus may be found as late as three or four months after recovery. There is no question, therefore, as Paul and Trask and their collaborators have pointed out, but what human feces and domestic sewage constitutes an important potential source or reservoir of the virus.

In considering the transmission of a fecal-borne pathogen two mechanisms are distinguished for convenience in discussion. The first will be called the "intramural" mechanism. This refers to the more or less direct transfer of feces through contamination of hands, articles, and food within the household. The facility with which such passages occur is correlated with domestic cleanliness or home hygiene. The second will be called the "extramural" mechanism. This refers to the less direct transfer of fecal-borne pathogens through sewage to water, to milk, or to food, such as occurs in the natural history of typhoid fever. The frequency of explosive outbreaks due to contamination of common water, milk or food supplies is an index of community sanitation.

Paul and Trask¹⁵ and Melnick¹⁶ have repeatedly demonstrated that under certain circumstances the virus of poliomyelitis can be recovered from samples of domestic sewage obtained in nature, even though the methods available for its detection are relatively crude. How long the virus may survive in sewage under natural conditions is certainly variable. Laboratory observations made on the virus *in vitro* indicate a surprising degree of stability, particularly if made upon glycerinated emulsions of the spinal cord of a monkey. According to Ward and Melnick,¹⁷ "samples of sewage have on occasion been kept at 7° C. up to eighteen days and have been found to contain virus. Virus has been recovered, moreover, from the effluent of one Chicago disposal plant. The detection of virus in two successive tests from a New York sewage plant fifteen, and from a Chicago sewage plant seventeen days apart would indicate that even if virus is destroyed rapidly in this medium it may be as rapidly replaced."

The question is how the virus may travel from sewage, —if indeed it ever does—to a susceptible human being. The two obvious routes which must be considered are through pollution of streams to drinking water and through contamination of flies to food.

That water may be a medium of transmission of poliomyelitis is not a new thought. The hypothesis has been advanced by many authors. The question has been investigated by two approaches;¹⁸ first, laboratory studies of the survival of the virus in sewage, in sewage contaminated water and in water at various stages in the process of purification; and finally, demonstration of the virus in water used for drinking purposes; second, studies of the epidemiology of poliomyelitis to ascertain whether the

incidence and distribution of the disease is such as would be expected were water a common medium of dissemination.

With respect to the first, many experiments have been conducted. In most instances the investigator has used water samples to which poliomyelitis virus was added in the form of an emulsion of nerve tissue from an experimentally infected animal, and in a dosage which may be far higher than is realized in nature. The results have suggested that the virus might survive certain treatment processes, and the effect of chlorination under some circumstances. These experiments are merely exploratory, however. It must be accepted that at the present time there is not sufficient evidence available from laboratory experiments to say whether or not the virus is stable enough to survive the purification process to which polluted water is subjected before it is potable and safe for human consumption.

Nevertheless, until there is evidence to the contrary, it may be assumed that it is at least theoretically possible that the virus of poliomyelitis in domestic sewage may occasionally survive to reach water used for drinking or for swimming pool purposes. Bacteriological standards of safety, using the density of *E. coli* as an index, and based upon experience with typhoid fever, do not necessarily apply.

Laboratory evidence being inconclusive, recourse must ultimately be taken to the second approach in answering the question. That water is a medium of transmission of biological importance can be accepted only if it can be shown that the behavior of the disease in nature is consistent with this hypothesis. It is not sufficient merely to show that the causative parasite leaves the body of the human host in feces and survives in sewage. If this were the only requirement, tuberculosis might be classified as water-borne.

Specifically, what is the behavior that would justify the inference that poliomyelitis is water-borne? The question can best be answered by reviewing certain observations which have been made with regard to the prevalence of cholera and typhoid fever, diseases generally accepted to be water-borne. In general, their prevalence has been correlated with a poor sanitary environment including, but not necessarily depending directly upon, water supplies subject to human fecal pollution. In communities with a common water supply subject to such pollution, the incidence has tended to be excessive and cases were scattered throughout the population in time, in place, and in persons (except as modified by immunity), as would be expected from a wide dissemination of the infective agent through the water distribution system. In some instances it has been possible to show that the incidence of one of these diseases was significantly greater in the group of people using the suspected water supply than in another or other groups using a different supply but alike in all pertinent respects. A classical example is John Snow's analysis of the mode of communication of cholera in South London.

In other instances it has been possible to show that an abrupt decline in incidence immediately followed the installation of a water purification plant, although living

conditions changed in no other important respect. Or, *per contra*, increased incidence has abruptly followed some breakdown in the treatment process or distribution system of a common water supply. Numerous examples of these contingencies can be found in the typhoid history of American cities and towns.

Perhaps most convincing of all are the explosive outbreaks in which groups of people were simultaneously infected, and it was conclusively shown that the only medium of common dissemination to which all or nearly all could have been exposed was a water supply subject to human pollution. Finally, it is to be pointed out that wherever sanitation has been improved, including the improvement in water supplies, these diseases have been unable to maintain their prevalence in human populations and have tended to decrease or disappear. This is the sort of evidence upon which it has been generally accepted that they are or may be water-borne.

Turning now to the extensive literature on poliomyelitis which has accumulated since the initial observations of Wickman, *epidemiological evidence of this character is conspicuous by its absence*. The incidence of this disease has not been highly correlated with sanitary environment. It has never been shown that either the epidemic or the endemic incidence of poliomyelitis is significantly associated with the quality and safety of drinking water supplies as determined either by a sanitary survey, or by bacteriological analysis, or by both. Assuming that filtration and chlorination are ineffective in removing the virus, then, for example, it would be expected that the incidence would have increased over a period of years in the cities which obtain their water from the Ohio river with its speedily increasing load of sewage pollution from domestic sources. On the other hand, it would be expected that small communities supplied with water, whether treated and chlorinated or not, but from watersheds or underground supplies which careful sanitary surveys have shown were protected from human fecal pollution, would have a conspicuously favorable experience with poliomyelitis, yet sharp outbreaks have occurred in such communities. When poliomyelitis has invaded large urban communities whose population is served simultaneously by a common water supply, the cases have not been scattered in time, in place, and persons in the sudden random fashion which is expected. The disease has characteristically manifested a slow radial or progressive spread from initial foci. When poliomyelitis has occurred in rural areas, it has moved at a strikingly constant speed from place to place in a wholly unpredictable manner, but unaffected by the character of the local private water supplies. Finally, and perhaps most important of all, there is on record at present not a single instance of an explosive outbreak of this disease which has been attributed to simultaneous exposure of a group of people to a common source of water.

Nor can the absence of epidemiological evidence incriminating water as a medium of transmission be attributed to insufficient investigation. There exists now in the literature a large number of studies made by competent epidemiologists on the conditions under which poliomyelitis occurs and spreads. Many of these investi-

gators have had extensive experience in tracing water-borne epidemics of typhoid. Even if it be true that the result of mass-exposure might in part be masked by the presence of large numbers of immunes and inapparent infections, nevertheless recognized paralytic cases have been sufficiently numerous to call attention to instances in which the infection was apparently milk-borne and one where a lemonade stand was thought to have been a center of exposure.¹⁹

Since there seems to be no crucial evidence to justify the hypothesis that drinking water is a common and important medium for the transmission of poliomyelitis virus from sewage to man, other possibilities must be given careful consideration. The recent demonstration of virus in the bodies of flies trapped in epidemic areas is extremely interesting in this connection.²⁰⁻²⁴

In most instances the flies from which virus has been isolated were trapped in areas where sanitation was very primitive and there was ready access to exposed feces, but in one case²⁰ they came from a good residential district where no privies were found.

Studies on the exposure of various species of flies to spinal cord emulsions infected with the Lansing strain of human poliomyelitis,²⁵ leave no doubt that virus in this form is incapable of multiplication in the fly. Human poliomyelitis virus has not been isolated from the bodies of flies more than 48 hours after the exposure of the insects.^{25,26,27} thus suggesting that the fly is a short term vector. In these experiments house flies were found to be more efficient carriers of both viruses than filth flies, although the latter have been implicated in field tests. It is important to stress again the fact that survival experiments of virus on flies have not been conducted with stool virus and that its ability to resist drying in this form is completely unknown.

It must be granted, nevertheless, that the virus of poliomyelitis is occasionally present on flies, and that this insect may act as a mechanical vector between feces or sewage and food. There is at present no epidemiological evidence which would permit an assessment of the relative importance of this route of transmission. It is apparent that the disease can attain wide dissemination in areas and under climatological conditions where few flies are on wing, and that homes which are well protected by screening are invaded by the disease nevertheless. The suggestion made by Ward and Melnick, that "other possible agents such as certain forms of insect, avian and mammalian life which may come into contact with both sewage and man" may be implicated, furnishes an hypothesis which awaits investigation.

Returning to consider the intramural mechanism, it must be conceded that there are many points in favor of the view that the virus of poliomyelitis is transmitted from person to person more or less directly by fecal contamination of hands, articles and food within the household or through the common eating place. There are attractive analogies between some of the epidemiological characteristics of poliomyelitis and of bacillary dysentery. Both tend to prevail endemically with occasional periods of epidemic spread. They have a somewhat similar seasonal distribution and age selection. Bacillary dysentery

rarely occurs in explosive outbreaks due to contamination of a common water or food supply, but is commonly maintained by person to person contact within the household, the intramural mechanism of fecal contamination. In addition to this consideration, attention has been called by Max Theiler to a paralytic disease of mice due to a virus quite similar to that of human poliomyelitis. In mouse colonies it appears to be widely distributed in inapparent form, with the rare instances of paralysis, and maintained in passage by fecal contamination of food.

Against this hypothesis must be weighed one striking inconsistency in the behavior of human poliomyelitis. Many investigators have attempted without success to demonstrate a correlation between the incidence of this disease and the degree of cleanliness (a sanitary or economic status) of neighborhoods, premises and houses. Its spread does not seem to be influenced by environmental conditions of this kind. With equal facility it invades the homes of the well-to-do with all manner of sanitary conveniences and the homes of the poor with none.

In conclusion, it is proposed to examine the alternative hypothesis, that is, that the principal medium of transmission is by secretions of the oropharynx either through contamination of objects subsequently introduced into the mouth or through air-borne droplets and droplet nuclei. Up to a few years ago this hypothesis was generally accepted. It was largely abandoned because of two contributions from the experimental laboratory. First, evidence was advanced which indicated that in the human disease the olfactory tract was not the common portal of entry. Second, investigators were much more successful in demonstrating the virus in fecal specimens, than in nasal washings obtained from paralytic and non-paralytic cases of the disease.

In reviewing the methods which had been used for recovery of the virus from the oropharynx, it appeared to my colleagues that the failure might in part be due to the technic.¹⁸ During the last year this question has been explored and the results are not yet completely available. Instead of attempting to irrigate the throat, a cotton swab on an applicator was rubbed over the tonsillar region and the posterior pharyngeal well of patients in the first week of their illness. The swab was preserved by freezing and stored at a low temperature for several months. Recently the material in these cotton swabs was eluted in a small quantity of an appropriate liquid medium. The resulting suspension was injected into the brain of rhesus monkeys. So far, swabs from 14 patients collected in this manner have been tested. The virus of poliomyelitis has been recovered from 7, or 50 per cent.

The rate of recovery of the virus from the oropharynx of patients thus compares favorably with that from fecal specimens. These observations are being continued and extended. It is pertinent to recall in this connection the relation of tonsillectomy to poliomyelitis.

Even if it be demonstrated that the virus is always present in the oropharynx during the early stages of infection, it does not necessarily follow that the principal medium of transmission is by means of secretions from

the oropharynx and that poliomyelitis is conveyed by person to person contact of the kind that is effective in maintaining such diseases as chickenpox, measles, and mumps. More evidence is required. At the same time it should be pointed out that nothing in the epidemiological behavior of this disease is inconsistent with this explanation, except possibly the seasonal distribution, and there may be an explanation for that which is not immediately apparent.

Finally, it is within the realms of possibility that both mechanisms of transfer are operative,—the respiratory contact and the fecal contact—and that each plays a role in maintaining passage of the virus through human populations.

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The Central Nervous System in Poliomyelitis and Polioencephalitis*

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AN extensive literature has accumulated on the subject of the pathological changes within the nervous system in infantile paralysis. In spite of the steady accumulation of publications, almost no new observations have been advanced since the comprehensive studies of Rissler¹ in 1888. There appears to be no disagreement in the literature as regards the nature of the pathological lesions in poliomyelitis. In general, they consist of three groups of changes, namely, (1) meningitis, (2) mesodermal-glial reaction with a hyperemia, edema and cellular infiltration of both a perivascular and diffuse nature and, finally, (3) ganglion cell damage implicating primarily the neurons of the anterior horns, the bulb, and various cortical areas.

In spite of the general agreement as to the nature of the pathological lesions in this disease, a very important question regarding this pathology has remained unanswered and has actually been responsible for much of the continued research in this field. This controversy revolves around the question of whether the ganglion cell changes or the mesodermal-glial alterations comprise the primary changes. The more recent literature tends to favor the former as being the primary alteration in this disease, with the interstitial cell changes being secondary and non-essential.

In view of the numerous and comprehensive studies on the pathology of poliomyelitis by many competent pathologists, one cannot hope to offer any new or startling observations on this subject. However, because of the many conflicting viewpoints regarding the significance of the various pathologic changes, it would seem of definite value to review again the histopathology in an attempt to arrive at some acceptable conclusions concerning these lesions and their significance.

HISTORICAL REVIEW

The first pathological studies in poliomyelitis were made by Cornil² who described the cord of a 49-year-old female who had been infected at the age of 2 years. Histologically no significant changes were observed. Charcot later described a reduction of the anterior horn cells in the same case. Charcot and Joffroy³ in 1870 published the first detailed pathological studies. Their case was also one of a chronic poliomyelitis. These authors carefully compared the regional muscle atrophy with the corresponding spinal cord levels and observed a definite and often severe decrease in the number of anterior horn cells. Secondary to the neuronal damage, there had also resulted a mild glial increase. These authors were the first to emphasize the importance of the neuron damage and to demonstrate its accurate correlation with the clin-

ical paralysis and the muscle atrophy. As will be seen, this concept of Charcot and Joffroy has continued to be popular and has received a large following within recent years (Fairbrother and Hurst,⁴ Bodian and Howe,⁵ Sabin⁶).

As early as 1871 Roger and Damaschino⁷ took issue with this primary neuronal theory. These investigators studied three cases of acute poliomyelitis, which terminated fatally from two to thirteen months following the onset of the illness. They were impressed by the severe inflammatory changes involving chiefly the anterior horns but also extending throughout the gray matter. The involved regions showed vascular changes with hemorrhages, perivascular and diffuse leukocytic infiltrations, and even tissue softening with cavitation. Ganglion cell damage occurred but usually in those areas most severely injured. These authors felt that poliomyelitis was primarily an interstitial myelitis with the nerve cell alterations being secondary to the inflammatory reaction.

Roth⁸ in 1873 substantiated the findings of Roger and Damaschino. He observed within the anterior horns of an acute case of poliomyelitis, scattered areas of cavitation with numerous perivascular and diffuse infiltrates. He stated positively that poliomyelitis was an interstitial myelitis and that the neuronal damage was secondary.

Similar emphasis has been placed upon the inflammatory reactions in poliomyelitis by Rissler,¹ Dauber,⁹ Wickman¹⁰ and many others. Rissler's studies published in 1888 have been unsurpassed for their accuracy and detail and remain today as a histopathological classic. He studied the lesions in five cases, three acute and two chronic. He described in great detail both the ganglion cell changes and the interstitial cell reactions. The former he studied from the earliest stages of swelling and chromatolysis to the final phases of destruction with neuronophagia, fragmentation and dissolution. Almost every type of mesodermal reaction was observed and commented upon. He described vascular congestion, hemorrhage, perivascular changes, diffuse leukocytic reactions, gliosis, tissue injury and even cavitation. Rissler was puzzled as to which of the alterations were primary. He admitted that both occurred together, but he felt that he could more commonly observe neuronal changes without interstitial reactions than the reverse. He thus felt that the former was the essential lesion in this disease.

In contrast to this view were those of Dauber⁹ and Wickman,¹⁰ both of whom described changes almost identical with those seen by Rissler. Dauber in 1893 published his studies on a single acute case. He, for the first time, emphasized the pial involvement in this disease. He described a marked meningitis with the entire subarachnoid space interspersed with leukocytes, chiefly mono-

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nuclears. Dauber insisted that poliomyelitis was fundamentally an inflammatory reaction although he admitted that perhaps the same toxic agent could concomitantly injure the nerve cells.

Wickman¹⁰ was even more insistent in his views. He studied five cases carefully and was impressed by the mesodermal reactions that seemed to localize within the gray matter of the spinal cord. This author believed that the severity of the ganglion cell change usually was in direct ratio to the intensity of the interstitial reaction. He insisted that degenerated nerve cells unaccompanied by interstitial changes never occurred in man. In the brain stem, Wickman was particularly impressed by the correlation of the two types of changes. Where interstitial changes were absent, the ganglion cell always appeared normal. In the more evident areas of infiltration, the nerve cells showed correlated degrees of damage.

In 1935 Horányi-Hechst¹¹ reported on 38 cases of acute poliomyelitis ranging in age from two months to 29 years. He again described the characteristic lesions in poliomyelitis, but for the first time offered an adequate correlation and interpretation of the complete findings in this disease. His deductions certainly warrant listing at the present time and are as follows:

1. The nerve cell changes were the *most important* change, since upon them depend the functional damage. These authors felt that most nerve cells disappeared by neuronophagia, an observation not completely substantiated to date.

2. The inflammatory mesodermal reactions often formed the dominating change and were frequently present in areas where no nerve cell damage had occurred or in areas where there were no nerve cells, such as in the molecular layer of the cerebellum. He felt, therefore, that these interstitial changes were also primary changes and produced by the same agent and independent of the neuronal alterations.

3. In every single case, regardless of the acuteness of illness, some mild or severe meningitis appeared. The meningitis also showed no correlation to the other cellular changes and occurred where cells were uninvolved as the frontal lobes, occipital lobes and over the cerebellum.

As a result of more recent experimental investigations, there has been a tendency to again narrow the significance of the spinal cord changes to the neuronal damage. Probably one of the most significant experimental studies was that of Fairbrother and Hurst,⁴ who inoculated the poliomyelitis virus intracerebrally into monkeys and systematically studied the spread of the virus by means of the histological changes resulting within the various regions of the nervous system. They observed that the virus spread by means of the axons in a fairly systematic manner until it reached the midbrain. From here the virus spread indiscriminately by both motor and sensory axons, causing the disease to break out at many levels of brain stem and cord. Owing to the greater susceptibility of the lumbar cord, these levels first manifested clinical paralysis. These authors admitted that meningitis and interstitial cell reaction always occurred, but they felt that the latter changes were always most marked where

the nerve cell damage was most severe and therefore were probably the result of such damage.

Bodian and Howe⁵ in 1941 produced hemidecortication in monkeys, producing retrograde disappearance of nerve cells of the corresponding optic thalamus. When the virus was then inoculated directly into this thalamus devoid of nerve cells, very little mesodermal-glial lesions developed. From these studies the authors concluded that the mesodermal-glial response in poliomyelitis was secondary to a chemical resultant of the interaction of the virus with susceptible neurons rather than to the direct action of the virus upon mesodermal tissues.

Sabin⁶ in a very recent study upon human material also concluded that the primary lesion in poliomyelitis was the neuronal damage. He admitted that there was an associated interstitial and perivascular alteration. He was impressed by the fact that damaged neurons occurred among normal ones, indicating that the inflammatory process could not produce the nerve cell damage.

From a review of the literature, it becomes apparent that in this disease, the neuronal damage is of utmost importance but one wonders about its primary occurrence. It seems more practical to consider the suggestion of Flexner and Lewis,¹² who wondered "whether this virus did not perhaps possess an affinity for nervous tissue in general but for no elements of these tissues in particular. The constancy with which the meninges, blood vessels, interstitial parts or nerve cells are affected indicate that they all react to the presence of the virus." Naturally, only involvement of the neurons within the cord would produce functional damage and clinical disturbances.

Although the lesions in poliomyelitis tend to be much more severe and frequent within the spinal cord, changes of a similar nature can also occur within the brain. Stadler¹³ in a review of a series of cases, observed cerebral changes in 9 per cent while Lemmon¹⁴ reported as high as 34 per cent in a series of 49 patients. Horányi-Hechst¹¹ recorded one of the most complete studies of the cerebral pathology in this disease. In his 38 cases, 24 showed cerebral alterations, chiefly of an interstitial type limited primarily to the precentral cortex. Many of the nerve cells also revealed typical acute changes. In 17 cases, the white matter showed inflammatory alterations. Glial nodules and inflammatory exudates were observed in the molecular layer of the cerebellum, the basal nuclei, the claustrum and the hypothalamus. A similar selectivity within certain cerebral regions was reported by Andre-Thomas and Lhermitte,¹⁵ Spielmeyer,¹⁶ Fairbrother and Hurst,⁴ Stiefler and Schenk,¹⁷ Demme¹⁸ and others. Swan¹⁹ in a study of eight cases described neuronal alterations in the precentral gyrus of all but one patient. Howe and Bodian²⁰ reported on 13 human cases. They observed in 12 cases, lesions consisting of perivascular cuffing, neuronophagia, focal mesodermal-glial infiltrations. Two showed slight lesions in the frontal granular cortex. Marinesco and his associates,²¹ in a Roumanian epidemic in 1927, noted perivascular and interstitial infiltrations as well as nerve cell injury in the substantia nigra of patients dying of poliomyelitis. Such findings occurred in 16 of their 28 cases and prompted

the authors to speak of a mesencephalic form of this disease. Finally, Abramson²² reported 43 cases of acute poliomyelitis in which 30 showed medullary lesions, 14 mild cerebral lesions and 5 cerebellar changes. The latter were observed primarily below the cellular layers and below the granular and Purkinje cell layers, chiefly among the fibers radiating out from the cortex.

CASE STUDIES

Although many cases of poliomyelitis are available for study in our laboratory, an elaboration of the findings in each would merely result in a great deal of repetition. For this reason only a few illustrative cases will be presented followed by a summary of the pathological lesions in this disease. The following observations are based on a careful section throughout the nervous system, each section being prepared with the numerous specialized technics used in the study of the nervous system.

Case 1. Acute poliomyelitis. A 9-year-old female expired after a 20-day illness beginning with diarrhea, abdominal pain and elevated temperature. Paralysis of both legs 15 days before death. Death from respiratory paralysis. Lesions chiefly limited to the neurons and localized to the medulla and lumbar cord.

L. K. (H. N. 718187), a 9-year-old girl, was admitted to the hospital seven days before her death because of a flaccid paralysis of both lower limbs. About two weeks prior to admission, she developed diarrhea associated with a fever which lasted only two days. Five days later, weakness first appeared in the lower limbs and progressed to a complete paralysis within twenty-four hours. On admission, the patient showed a marked cervical rigidity but no involvement of the upper limbs. There was some dysphagia and dysarthria. In spite of intensive symptomatic treatment, she rapidly went downhill with increasing respiratory difficulty.

Autopsy: The changes were limited almost exclusively to the medulla and the lumbar cord. Only isolated foci of perivascular lymphocytes were present. The interstitial cell reaction was striking by its almost total absence. The nerve cells of the bulb and the anterior horn cells of the lumbar cord were severely damaged. The involved neurons showed a marked swelling with a perinuclear chromatolysis (Fig. 1). Many of the more severely injured elements were completely chromatolytic, irregular in outline and even fragmented. These neurons were irregularly implicated, many injured cells being visible among large groups of structurally intact elements. Neuronophagia was not seen in spite of the often severe cell damage. In the lumbar cord, the anterior horn cell injury was much more severe on the right side than on the left. Within the same sections the neurons within the left anterior horn showed very little change while those on the right revealed extensive damage with hardly a normal cell being visible (Figs. 1a and 1b).

Comment: This case is of great interest for two reasons. It illustrates the curious limitation of the pathological lesions to isolated regions of the nervous system, namely, the lumbar cord and the medulla. This pathological localization correlated very closely the clinical involvement presented by the patient. The second point of interest is the predominance of neuronal alterations. Certainly from this case one must accept the fact that virus of poliomyelitis does have the faculty of attacking and injuring the nerve cells without producing any other type of tissue alterations.

Case 2. Acute poliomyelitis. A 23-year-old male with an illness of 11 days. Onset with back and leg pain followed by weakness of left arm and both legs. Death from medullary involvement. Autopsy revealed lesions of

both interstitial and neuronal type scattered from mid-brain to lower cord.

T. S. (H. N. 699380), a 23-year-old male, first became ill four days prior to admission to the hospital, at which time he noticed excessive fatigue and some pain in the back and legs. Two days later he first developed paresis in both lower extremities with urinary difficulty. By the time of admission, both legs were paralyzed and weakness had appeared in the left arm. The patient was unable to arch his back. The paresis soon spread to implicate the intercostal and abdominal musculature. Respirations became labored. The patient's temperature varied between 100—101.4° and his leukocyte count was 14,850. His condition did not improve and he expired after seven days in the hospital.

Autopsy: Histologically the lesions consisted of a mixture of interstitial and neuronal changes with the former predominating. The brain was uninvolved. The midbrain and pons contained only scattered areas of perivascular mononuclears and some vascular congestion. The neurons were structurally uninvolved. The medulla showed only minimal mesodermal changes but very extensive nerve cell alterations involving almost every nerve cell group. The severity of the neuronal alterations varied from mild swelling to complete chromatolysis, fragmentation of cell processes, and even disintegration of some of the cells. Scattered elements within the olives showed definite changes. In spite of this extensive neuronal damage, the only interstitial cell reaction consisted of isolated mild perivascular infiltrates. Meningitis was mild but definite.

The spinal cord was involved at all levels. Within the cord, the mesodermal reaction was much more marked than the nerve cell changes. The body and anterior horns of the gray matter were almost completely replaced by perivascular, focal and diffuse infiltrations of leukocytes, both polymorphonuclear and mononuclear. So severe was this inflammatory change, that the underlying tissues had undergone softening and even vacuolization with invasion by fat granule cells (Fig. 2). The nerve cells, chiefly those within the areas of most severe tissue damage, had undergone fragmentation with only fragments of the cells remaining. In the less severely damaged segments of cord, the neurons showed much milder changes consisting of mild swelling and chromatolysis.

Comment: This case again illustrates the tendency of the poliomyelitis virus to pick out specific areas within the nervous system. In the cord aside from the meningitis, only the gray matter was involved. One should note the extreme degree of dissociation of the two types of changes, namely, the interstitial and neuronal. In the pons and midbrain only the former occurred, while in the medulla, chiefly the latter. From this case it appears evident that the virus has the ability to attack either of these tissue elements entirely independent of one another. In the cord, the changes were so intermixed and severe that it was impossible to decide which was the predominant one.

Case 3. Acute poliomyelitis. Fulminating illness of 7 days duration, beginning with nausea and vomiting and rapidly terminating fatally from respiratory failure. No involvement of the limbs. Pathologically, lesions were scattered from the basal nuclei to the cervical cord. The predominant change was mesodermal with nerve cells involved chiefly within the medulla.

J. S. (H. N. 685215), a 17-year-old white male, expired after a one-day hospital stay. Six days previously he had developed malaise, nausea and vomiting. He seemed feverish. Shortly before admission he experienced some difficulty in breathing and swallowing and was, therefore, rushed to the hospital. The neurological examination was negative except for dysphagia and dyspnea. His temperature was 102.8°, pulse 100 and respirations 26. Spinal fluid contained 89 cells, chiefly polymorphonuclears. Respirations became more difficult and the pulse more rapid. He became deeply cyanotic and expired after one day.

Autopsy: Inflammatory changes were prominent within the

basal nuclei and the pons. Many of the vessels were congested and surrounded by cuffs of mononuclears (Fig. 3). Petechiae were numerous and often extensive (Fig. 4). The cells of the basal nuclei and the pons showed only isolated minimal alterations of swelling and a fading out of some of the Nissl granules. The brain aside from the above structures was uninvolved. The medulla and the cervical cord comprised the most severely damaged portions of the nervous system. In the medulla, the neuronal changes were most marked. Hardly a normal nerve cell could be found. So rapid and severe was the damage, that fragmentation and cell dissolution had occurred, resulting in many tiny cell fragments. Milder changes of swelling and chromatolysis was also very prominent. The only inflammatory reactions within the medulla consisted of scattered petechiae, and some perivascular and focal leukocytes.

In the cervical cord, most of the changes were of an inflammatory nature and occurred only within the anterior horns. This entire region was infiltrated by a diffuse leukocytic invasion of a nonvascular arrangement. Curiously enough, even those anterior horn cells situated within or adjacent to this severe inflammatory reaction, showed no signs of anatomic involvement (Fig. 5). A few scattered foci of perivascular leukocytes were present within the white matter. No cord changes were detected below the upper thoracic segments.

Comment: The extreme degree of correlation between the pathological lesions and the clinical symptoms is very well demonstrated by this case. The most instructive lesions occurred in the cord, where the interstitial changes occurred in and about the anterior horn cells without injuring the latter either structurally or functionally. Such observations establish beyond any question the fact that the mesodermal reactions do not depend upon the neuronal changes and that the poliomyelitis virus is capable of acting directly upon the interstitial elements. It is to be noted that when the illness is fulminating, vascular alterations and hemorrhage are more prominent.

Case 4. Male, aged 36 years. Six days before death, onset of malaise, and stiff neck, followed by vomiting and weakness of neck and arms. Rapid appearance of respiratory difficulties with fatal termination after three days' hospitalization. Autopsy; a polioencephalitis with extensive inflammatory and neuronal alterations throughout all areas of the central nervous system, particularly the brain.

A. S., a 36-year-old manual laborer, was well until three days before admission when he noticed generalized malaise, weakness and pain in the back of head and neck. Vomiting soon ensued associated with weakness of the entire right arm. On admission, the patient was acutely ill with a temperature of 101° F. His neck was stiff and he had some weakness of both upper extremities. He had difficulty in raising himself without help. A spinal puncture revealed 217 cells per cm. and 51.7 mg. per cent of protein. His course was rapidly downhill. On the following day he evidenced difficulty in coughing. This was followed by breathing impairment as well as by dysphagia. The patient soon became cyanotic and was placed in a Drinker respirator. His pupils became dilated and fixed, pulse became rapid and weak, he lost consciousness and finally expired on the third hospital day.

Autopsy: The changes were very severe throughout all areas of the cerebral hemispheres, showing no particular tendency to localize, except for being a little more severe within the cortical layers. All elements were involved, both mesodermal and ectodermal. Most of the cerebral vessels were surrounded by cuffs of mononuclears, with many of the involved vessels revealing a striking endothelial proliferation, often with partial vessel occlusion. In scattered areas, there were isolated foci of leukocytes forming tiny abscesses (Fig. 6). The nerve cells were irregularly involved throughout the cortex, although their damage seemed somewhat more severe within the motor areas. The injured cells showed a tremendous swelling with complete fragmentation of the processes, resulting in a round, lightly staining

cell structure containing either an unaltered or an eccentrically placed nucleus (Fig. 7). Chromatolysis was usually complete in such cells. Many ghost cells were visible, particularly in the motor cortex. A number of injured ganglion cells did not manifest this extreme degree of swelling, but instead, revealed a partial chromatolysis and a mild cell fragmentation. Such damaged cells frequently showed all stages of neuronophagia from a mild invasion by a few leukocytes to complete replacement of the cell by the phagocytic elements (Fig. 8).

The alterations within the medulla were most severe. Many of the cranial nerve nuclei, particularly the vagi, were completely destroyed by the extensive hemorrhage and the inflammatory elements (Fig. 9). The latter were so prominent that it was impossible to determine the presence of specific neuronal alterations.

The entire cord showed some changes. Within the white matter there appeared only perivascular cuffs involving those vessels lying adjacent to the commissures. Within the gray matter, the lesions were most marked within the anterior horns which were frequently replaced by focal and diffuse collections of both polymorphonuclear and mononuclear leukocytes. The nerve cells within the cord seemed to be damaged only secondarily to the inflammatory changes. In those segments where the mesodermal reactions were mild, the nerve cells remained intact. Meningitis was present throughout the various cord segments.

Comment: The ability of the poliomyelitis virus to concentrate within the brain is well demonstrated by this case. It should be noted that the lesions, contrary to many experimental observations, were not localized to any particular region but were scattered indiscriminantly throughout the hemispheres. Both the neurons and the interstitial elements participated in the involvement but frequently independently of one another. There was no correlation between the two types of alterations. Within the medulla and spinal cord, the predominant changes occurred within the interstitial elements and it was very apparent that much of the neuronal damage was dependent entirely upon the severe inflammatory destruction of the associated tissues.

Case 5. Chronic poliomyelitis. A 25-year-old female, after 6 days of headache and fever, developed a quadriplegia with respiratory paralysis. She was placed in a respirator, where she remained off and on for 637 days, when she died from a bilateral pyelonephritis. While in the respirator she delivered a normal female child. Autopsy revealed an extensive tissue destruction with cavitation involving both gray and white matter of all cord levels. The brain above the medulla did not contain lesions.

Mrs. G. V. (H. N. 685733), a 25-year-old housewife, became ill with diarrhea and malaise lasting eight days. This was followed by headache, fever, and weakness of the legs. On the day of admission pain and weakness also had appeared in the arms. When she was examined, she was three months pregnant. There was a flaccid paralysis of all limbs, with almost complete involvement of the muscles of respiration. There was hypesthesia to light touch in the skin of the legs. A lumbar puncture revealed 175 cells with 82 per cent mononuclears. The patient was placed in the Drinker respirator where she remained off and on until her death almost two years later. Three months after admission she developed a urinary infection that proved very resistive to all forms of treatment. Five months after admission, she was delivered of a normal female by cesarean section. The wound healed nicely without complication. Following her delivery, she improved sufficiently so that she could remain out of the respirator for eight-hour intervals; however, every time her kidney condition would flare up, she would have to be returned to the respirator. One year after admission, the patient developed bilateral renal calculi which further complicated the kidney picture. From this time on, her course was downhill. She expired after a hospital stay of almost two years.

Autopsy revealed a bilateral pyelonephritis, renal abscesses, hydronephrosis and renal calculi. The brain was negative grossly. Microscopically it revealed mild toxic changes within scattered neurons. The entire cord showed an almost complete destruction of the anterior horns and body of the gray matter. The parenchyma in these regions was destroyed and replaced by varying-sized areas of vacuolization and cyst formation. These cysts were frequently infiltrated by a delicate network of astroglial fibers forming an incomplete repair. The degree of actual tissue destruction varied from level to level, being most severe in the lower segments of the cord. Aside from this cavity formation, there was also observed throughout the gray matter, a diffuse glial increase as well as scattered glial nodules and mild perivascular infiltrates (Fig. 10). The anterior horn cells showed typical chronic changes. Most of the cells had disappeared or had been so altered that they could be identified only with difficulty (Fig. 11). Scattered isolated cells, chiefly within the thoracic cord levels, appeared almost normal in structure. However, even these appeared very small and slightly rounded. Careful study revealed only the remains of injured neurons. In these, the cell body was often shrunken or fragmented, leaving only a thin, irregular layer of cytoplasm surrounding a small pyknotic or even an apparently intact nucleus. The cell processes were generally absent or extended as short processes in a bipolar fashion (Fig. 11). Many segments of cord showed no surviving neurons. In some areas the injured elements could not be separated from the proliferating glia.

All levels of the spinal cord also revealed a mild diffuse demyelination, involving the anterior and posterior columns (Fig. 12). The meninges contained a mild inflammatory change of a chronic type with some thickening of the leptomeninges. Free mononuclears were still visible. In some areas the chronic leptomeninges had resulted in complete obliteration of the subarachnoid space.

The most striking alteration was the alterations within the vessels both within the gray and white matter of the cord. These vessels were surrounded by a chronic connective tissue proliferation which had produced a wall thickening and, in many cases, even a partial lumen occlusion. No free cells were visible within the perivascular spaces.

The peripheral nerves to the lower limbs showed an extensive demyelination with some replacement of the nerve by connective tissue. Both axons and myelin sheaths had undergone destruction.

Comment: This case illustrates the nature of the tissue alterations in a case of chronic poliomyelitis. The destruction apparently included all cord elements with the parenchyma undergoing vacuolization. The changes were a little too severe to allow for a careful study of the intermediate stages of neuronal alteration. It is interesting to note the extensive damage to the white matter that may result. This case also illustrates the possibility of the meningeal changes progressing to a chronic meningitis with a subsequent obliteration of the subarachnoid spaces.

Case 6. Male, aged 57 years. Poliomyelitis 17 years before death. Admitted because of carcinoma of thyroid and expired in 20 days. Autopsy, extensive neuronal changes involving chiefly the cervical and lumbar cord segments.

C. G. (H. N. 726426), a 57-year-old male, was admitted to the hospital because of pain throughout various parts of his body. He had been a patient at the hospital some 17 years previously with poliomyelitis. This ailment had left him with a residual paralysis of both legs and the left upper extremity. Examination revealed an enlarged thyroid. Tendon reflexes of the left arm and both legs were absent. There was a paralysis of the left arm and both lower limbs with marked muscle atrophy. During the course of his hospital stay, he showed a gradual downhill course and expired after twenty days from a primary carcinoma of the thyroid.

Autopsy: The changes were limited to the spinal cord. There was no evidence of neoplastic infiltration. Within the spinal cord, the predominant alteration was seen within the neurons.

Interstitial changes were almost entirely absent. In the cervical cord, the ganglion cells of the anterior horns were greatly reduced in number, being almost absent on the left side. On the right side, where many more cells were visible, they revealed numerous changes of a chronic type. The cell bodies were shrunken and moderately distorted. In many, the cell body had almost completely disappeared, leaving only a small pyknotic nucleus with irregular fragments of cytoplasm still attached. Intermixed with these greatly altered neurons, were a few much less involved, showing a normal architecture, but irregularly staining Nissl granules (Figs. 13a and 13b).

The lower thoracic and lumbosacral cord segments showed a most severe bilateral damage to the anterior horn cells, which were greatly reduced in number. Those remaining were usually bizarre in shape and reduced in size. Most granules were absent. In many of these cord segments, it was difficult to detect the fragments of the destroyed neurons.

In spite of the extensive neuronal damage, no glial increase had resulted in the involved areas. The anterior rootlets showed an almost complete destruction with disappearance of both myelin and axons. The posterior rootlets were intact.

Comment: In this case, the complete absence of any interstitial reaction allowed one to study carefully the chronic nerve cell changes. The close correlation between the paralysis and the severity of the anterior horn cell damage, leaves no question regarding the importance of the neuronal injury to the functional end result in this disease.

SUMMARY

Although the nature of the pathological lesions in poliomyelitis has already been covered in a description of the above six cases, it might be well to briefly recapitulate the histological changes in more general terms.

1. *Meningeal reaction.* Meningitis is an early lesion and will be found in most cases if searched for carefully. As a rule, the involvement is not severe and appears in scattered regions throughout the nervous system. The inflammatory cells are mostly small lymphocytes which become enmeshed within the subarachnoid space, often collecting within the commissures of the cord, where they form perivascular collars (Fig. 14). Generally, this meningitis tends to disappear in a few weeks. Occasionally it results in a mild connective tissue proliferation that may obliterate scattered portions of the subarachnoid space. Even in these chronic membranes, scattered mononuclears can be found. This meningeal involvement can and does occur independently of any other tissue reaction.
2. *Mesodermal-glial (interstitial) reaction.* These alterations may comprise the predominant tissue change or may occur together with severe neuronal damage. In view of recent experimental studies, some doubt has arisen concerning the significance of these changes as a primary site of involvement by the virus. Notwithstanding the observations in animals, one cannot escape the fact that in the study of human material, these mesodermal changes do occur independently of any other tissue change. Not uncommonly they appear as the only alteration among both structurally and functionally intact neurons. Moreover, these mesodermal reactions are observed in regions of the brain far removed from nerve cells such as deep within the white substance or within the molecular layer of the cerebellum.

(a) *Vascular changes:* Perivascular collections of

mononuclear cells comprise one of the most constant vascular changes seen in poliomyelitis. The degree of involvement varies from a few scattered cells that incompletely surround the vessel to heavy layers of leukocytes which fill the perivascular spaces and even invade the outer vascular tissues (Fig. 3). Usually the cells are predominantly small lymphocytes. Occasionally in acute fulminating cases, a few polymorphonuclear leukocytes are observed interspersed among the other cells. This type of vascular involvement first appears in two regions of the cord, namely, within the anterior horns and in the white matter adjacent to the commissures. Although occurring simultaneously in each location, these changes may appear independently in either location. After a few days numerous vessels become involved throughout the nervous system. Within the brain, this type of vascular change comprises the most common and often the only alteration visible. In severe cases of polioencephalitis, hardly a single area within the brain fails to reveal some perivascular infiltration.

When the perivascular infiltration is very severe, the leukocytes may extend inward to involve the vessel wall, or outward to invade the adjacent tissues (Fig. 3). When the extension is inward, there results a definite irritation to the vessel, producing an endothelial swelling and proliferation as well as some connective tissue increase within the wall itself. In either event, the vessel lumen becomes narrowed, occasionally producing a secondary anemia and tissue changes.

(b). *Leukocytic infiltration*: Extension of leukocytes from the vessels into the adjacent tissues occurs only in the more severe cases and usually predominates within the gray matter of the spinal cord, within the medulla and less commonly within the cerebral cortex. Early in the disease, this infiltration is extremely focal in nature, neighboring a vessel, and consisting chiefly of a mixture of polymorphonuclears and lymphocytes. In many cases, the leukocytic invasion remains localized, although varying greatly in size. Within the larger foci, the underlying tissues undergo a softening and fragmentation, eventually being invaded by phagocytes, which intermix with the leukocytes already present (Fig. 15).

When the illness is very severe or more prolonged, the leukocytic infiltration often spreads diffusely throughout the gray and even the adjacent white matter (fig. 5). Even within these areas of diffuse infiltration, there can also be observed additional focal and perivascular collections which usually predominate within the regions of the body and anterior horns of the gray matter of the spinal cord. The medulla can be diffusely replaced by such infiltrates, but similar involvement within the cerebral hemispheres almost never occurs. In the cerebrum the collections of inflammatory elements are at most focal in nature but even more frequently remain perivascular (Fig. 6). After a few days of

illness almost all the polymorphonuclears disappear, the exudate being comprised entirely of small mononuclears.

(c). *Hemorrhages*: Bleeding occurs only in the most fulminating cases. Hemorrhages of either a focal or diffuse nature can occur throughout the nervous system but are most frequently observed in those areas containing the most intense inflammatory changes (Figs. 4, 9). Special stains reveal very little vessel wall alteration, although changes no doubt must occur. The hemorrhages usually are in the form of petechiae of a ball type and not uncommonly are associated with slight fragmentation of the adjacent tissues (Fig. 4).

(d). *Tissue softening and necrosis*: Parenchymal softening is not a constant feature of poliomyelitis. It occurs chiefly in the more severe cases and is usually secondary to either a vascular occlusion or to an extensive exudative reaction. Most commonly, parenchymal softening is observed within areas of severe exudative changes. Since such severe inflammatory alterations occur almost exclusively within the gray matter of the cord, areas of tissue necrosis are observed almost exclusively in such regions. The involved tissues undergo a softening and even a fragmentation. Macrophages soon invade the necrotic areas to become intermixed with the numerous leukocytes already present (Fig. 15). These macrophages phagocytize the necrotic tissue as well as the destroyed leukocytes, eventually clearing the entire area of debris. The end result observed only in chronic cases of poliomyelitis, consists of numerous irregular cavities scattered irregularly throughout the anterior horn and body of the cord gray matter (Fig. 2). Occasionally these cavitations are multilocular and extensive enough to completely replace the involved gray matter and even to extend into the adjacent white matter. Curiously enough, this destructive process stimulates very little glial reaction. It is unusual, therefore, to observe any glial replacement or walling off of any of these cavitations, even in long standing chronic processes. In the brain, where the vascular and inflammatory changes are rarely severe, tissue destruction and cavitation are almost never observed.

(e). *Glial reaction*: Macroglial reaction is never pronounced in poliomyelitis regardless of the nature or extent of the associated interstitial reactions. Occasionally in subacute cases, tiny glial nodules can be observed in scattered areas within the gray matter of the cord, the medulla and cerebral cortex (Fig. 10). Diffuse gliosis of a very mild degree can frequently be found in the more chronic cases. This diffuse astrocytic increase is usually limited to the gray matter of the cord. It never becomes extensive and never results in a diffuse glial scar.

3. *Neuronal changes*. The changes within the ganglion cells have been excellently described in the literature. They may occur as the only alteration in poliomyelitis or may appear concomitantly with or secondary to the interstitial changes. The earliest

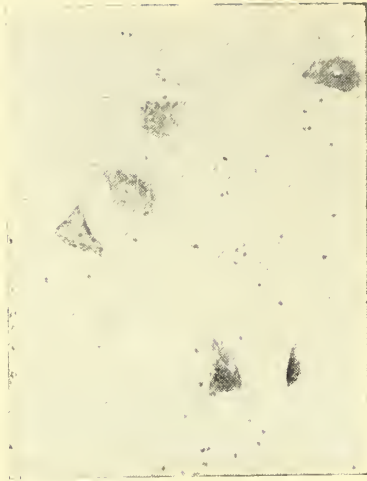


Fig. 1a. Case 1. Right anterior horn of the lumbar cord. The neurons are severely injured, showing swelling and extensive chromatolysis. (Nissl stain).

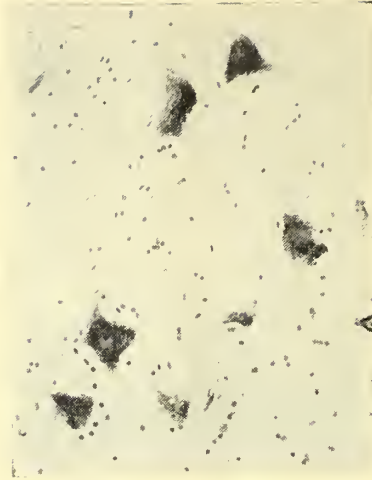


Fig. 1b. Case 1. Left anterior horn of the same spinal cord level. The cells appear normal. (Nissl stain).



Fig. 2. Case 2. Extensive softening and cavitation of the gray matter of the spinal cord. Most of the nerve cells have been destroyed. (Weil's stain).

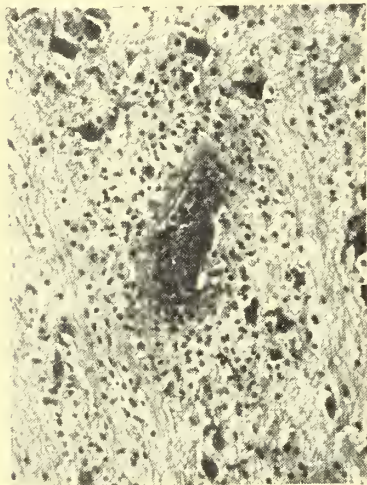


Fig. 3. Case 3. Section through the pons, showing a congested vessel surrounded by a cuff of inflammatory cells. The latter have extended into the adjacent brain tissue. The involved neurons appear pyknotic. (Hematoxylin-eosin stain).

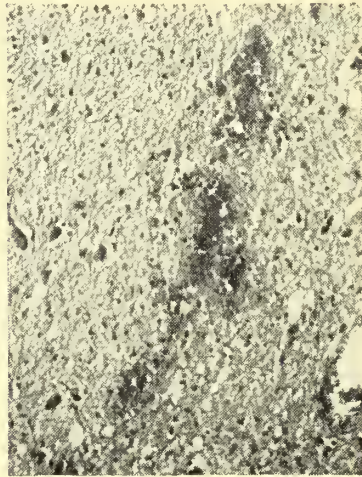


Fig. 4. Case 3. Petechial hemorrhages situated within the pons. The underlying brain tissue does not appear fragmented. (Hematoxylin-eosin stain).

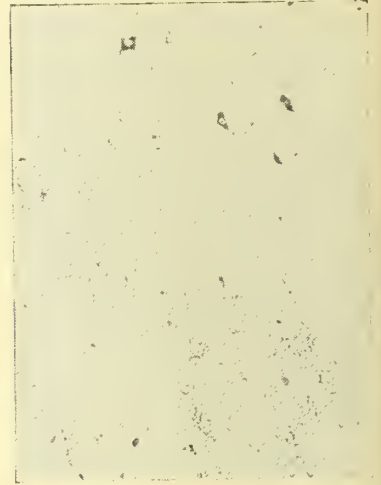


Fig. 5. Case 3. Cervical cord. Entire anterior horn is infiltrated by inflammatory cells. Anterior horn cells visible in this section do not appear involved in spite of their proximity to the leukocytic elements. (Nissl stain).

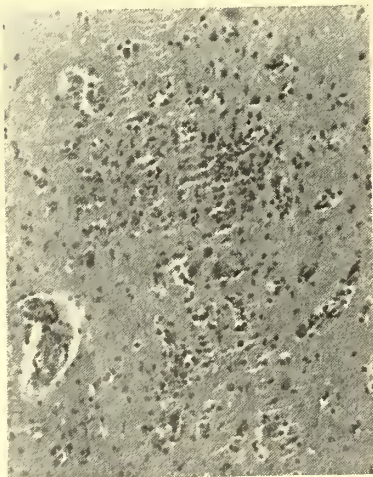


Fig. 6. Case 4. Small abscess within the cerebral cortex. There is a beginning softening of the underlying tissues. (Hematoxylin-phloxine stain).

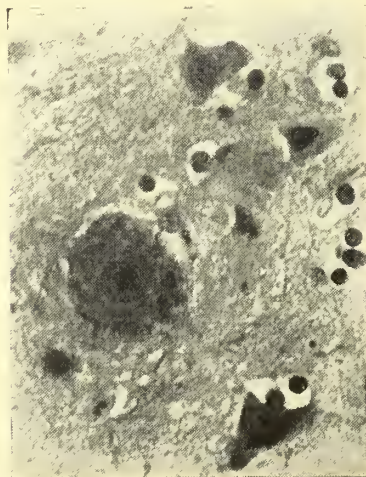


Fig. 7. Case 4. Cortical neuron. The injured cell is tremendously swollen. Most of the cell processes have disappeared, leaving a rounded structure. Chromatolysis is incomplete. Hematoxylin-phloxine stain.

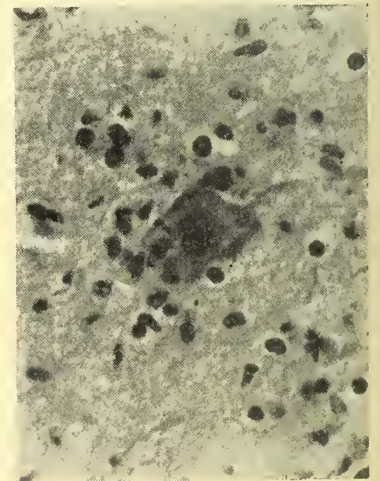


Fig. 8. Case 4. Early neuronaphagia. The involved cell shows a chromatolysis and some fragmentation of processes. Leukocytes have begun to collect about and to invade the injured nerve cell. (Hem.-phloxine stain).



Fig. 9. Case 4. Section through the vagus nucleus within the medulla. This is a low power magnification in order to demonstrate the extensive involvement of this cell group by hemorrhage. (Hematoxylin-eosin stain).



Fig. 10. Case 5. A glial nodule within the anterior horn of a case of chronic poliomyelitis. Note the diffuse cellular increase as well as the mild perivascular involvement. (Nissl stain).

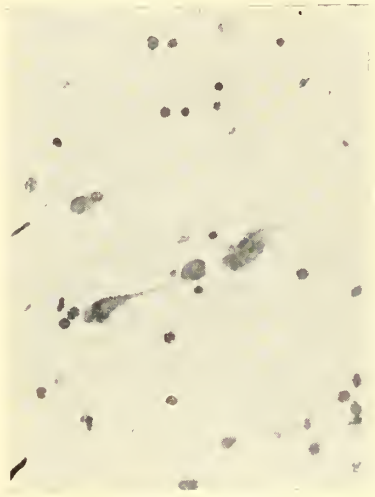


Fig. 11. Case 5. Chronic nerve cell changes within the anterior horn of the spinal cord. The cells are shrunken and their processes are absent. Even the nuclear structure cannot be identified. (Nissl stain).



Fig. 12. Case 5. Section through the spinal cord showing an involvement of the white substance. There is an extensive demyelination of portions of the posterior and lateral columns of the spinal cord. (Weil's stain).



Fig. 13a. Case 6. Section through the left anterior horn of the cervical cord. Most of the neurons have been destroyed. Those remaining show severe damage of a chronic type. (Nissl stain).



Fig. 13b. Case 6. Right anterior horn of same cord segment. Note that the cells are much less involved. No inflammatory changes can be seen. (Nissl stain).

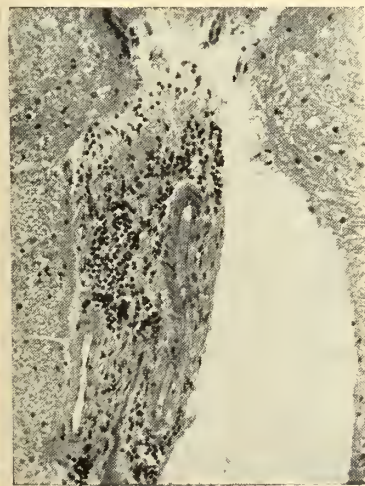


Fig. 14. Case 4. Mild meningeal reaction. The inflammatory elements have collected within the ventral commissure. (Hematoxylin-phloxine stain).

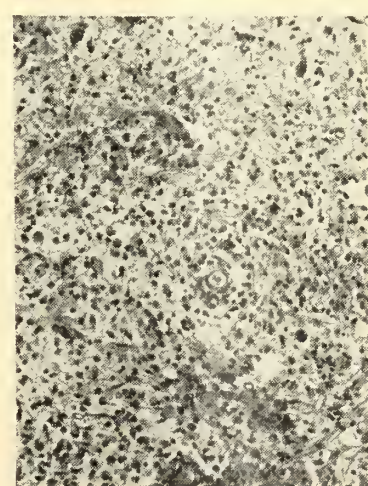


Fig. 15. Section through the gray matter of the lumbar cord. The entire area has undergone a softening and has been replaced by flat granule cells. (Hematoxylin-eosin stain).

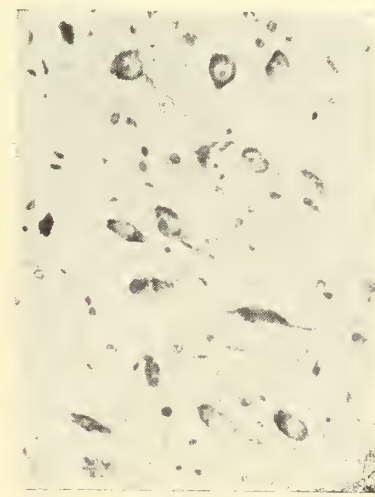


Fig. 16. Vagus nucleus in a case of acute poliomyelitis. Almost every cell shows some alteration. No inflammatory changes are visible. (Nissl stain).

alteration consists of an acute swelling and diffuse or perinuclear chromatolysis (Figs. 1a, 7). At this stage, the process is still reversible and if the disease becomes arrested, many of these cells will regain their normal function. If the process continues, the cell processes become fragmented and detached, leaving a rounded, swollen, light-staining cell that is identified chiefly by the still intact nucleus. Later even the nucleus undergoes changes, becoming eccentrically placed, losing its staining properties and eventually showing fragmentation, pyknosis and extrusion from the cell. Many of these severely damaged neurons undergo a fragmentation and shrinkage, leaving only an irregular mass of cytoplasm as a remnant of original nerve cell (Figs. 11, 13a).

The stage of cell alteration at which time neuronophagia occurs, will depend upon the rapidity of the neuronal destruction by the virus (Fig. 8). In many cases apparently structurally intact cells will become invaded by phagocytes, indicating that the cell although appearing healthy, has been destroyed by the virus. In most cases, however, neuronophagia occurs in ganglion cells that have obviously been injured as indicated by their marked anatomic alterations. Neuronophagia is not the usual process and most of the ganglion cells that are destroyed undergo fragmentation and dissolution without neuronophagia.

The neuronal damage often shows a most unusual distribution. The virus apparently has a selective action and picks out scattered elements throughout the nervous system. Isolated ganglion cells will frequently show changes in a setting of many normal elements. On the other hand, in severe cases most of a group of neurons will show changes of varying degree and severity with only scattered cells being entirely uninvolved and undamaged. Of all regions of the nervous system, the medulla most consistently shows neuronal changes, often in the absence of severe interstitial alterations. Almost every nuclear group in the medulla can be involved with the dorsal nucleus of the vagus being the most severely injured (Fig. 16). The cerebral cortex on occasion will reveal some cellular damage, although neuronal changes in this region are never marked. The basal nuclei, cerebellum, midbrain and pons as a rule show but little nerve cell damage, the interstitial changes predominating in these regions.

After this illness has reached its peak and starts subsiding, the neuronal changes may follow two courses; some may recover, regaining a normal structure, while others undergo a chronic progressive alteration with complete destruction. Recovery is experienced by many ganglion cells. This process is usually complete after a period of four to six months. These cells gradually return to normal size and the Nissl granules again become visible. Because of this cellular recovery, the nervous system in many mild cases of poliomyelitis often shows surprisingly little neuronal damage when examined a few months after the onset of the illness. In such cases, only scattered, partially altered neurons can be detected as an indication of the previously existing illness. The extent

to which the ganglion cells recover does not depend upon the number of involved elements but solely upon the degree of damage. Often in cases where the clinical picture indicates a widespread disease process the cell alterations are mild enough to allow for an almost complete cellular rehabilitation with corresponding functional return. When the injured nerve cells undergo irreversible changes, the corresponding functional unit loses permanently its ability to act. Such nerve cells may remain indefinitely as small fragments of cytoplasm attached to a pyknotic nucleus, or may completely disappear as a result of neuronophagia or dissolution, resulting in a great reduction in the number of remaining elements.

A third type of change may occur within nerve cells that at first appear to have been only slightly swollen and chromalytic. Instead of regaining their normal architecture, many begin to show typical chronic changes after some time. The cell body shrinks beyond the normal limits to result in a shrunken mass surrounding at first an apparently intact nucleus. The cell processes become narrowed and reduced in number, often resulting in two short slender bipolar processes extending from each end of a pyknotic cell body. The nucleus may remain structurally intact, or may also show changes.

CONCLUSIONS

1. A review of the literature reveals an unusual consistency in the nature of the lesions described as occurring in poliomyelitis.

2. Six illustrative cases of poliomyelitis and poliomyelitis are reviewed and discussed.

3. From the above cases, the following conclusions can be made concerning the pathology of this disease.

(a). Meningitis of a mild degree is one of the earliest lesions and occurs independently of any other changes.

(b). Mesodermal-glial (interstitial) changes comprise one of the most striking features. These changes may also occur independently of the other changes as indicated by their appearance among both structurally and functionally intact neurons as well as by their occurrence in regions where nerve cells are normally absent.

(c). The neuronal involvement constitutes the most important alteration because of the associated functional impairment. The damage to many of the nerve cells is reversible, with many neurons regaining normal function. Other neurons however, are irreversibly damaged.

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Electromyographic Studies in Poliomyelitis*

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THE study of the electrical characteristics of muscular action has been greatly advanced in recent years by developments in electronics making possible extremely sensitive high fidelity recording. A large volume of literature on the subject of action potentials has accumulated since the first reports of Piper in 1907¹ and Buchanan in 1908.² The wave-form, duration, voltage and frequency of the electrical component of nerve impulse and muscle contraction have been established by numerous investigators.³⁻⁸ These studies have included the behavior of muscles at rest, during various degrees of tension from active and passive stretching, and during voluntary and reflex contraction. Normal individuals and those with pathologic lesions resulting in spasticity, rigidity and chorea have been studied. The results of these researches form a basis for comparison with the findings which have been recorded in poliomyelitis.⁹⁻¹¹

METHODS

Two types of electrode and recording technics were employed in this study. In the majority of cases surface electrodes were used, made from solder discs, approximately 1 cm. in diameter, applied to the skin over the belly of the muscle with electrode paste and adhesive tape. A third electrode was placed on a neutral point to act as a ground. The recording was made with a standard Grass three channel ink writing electroencephalographic apparatus on paper which was run through at a speed of 6 cm. per second. The amplification of this apparatus is such that with the usual gain, a muscle potential of 1/100,000 of a volt causes a deflection of the pen of 1 millimeter. Calibrations were made with a standard input so that at any moment the voltage elicited from the muscle could be measured. This calibration refers to the voltage of each individual deflection. The summation of these voltages was also recorded by the use of an

integrator. This instrument works on the principle of a condenser discharge: the incoming potentials being conducted to a condenser which discharges each time it reaches its maximum load of known voltage, and in discharging operates an electric signal on the same record as the oscillographic tracings.

In some instances coaxial needle electrodes were inserted into the muscle and simultaneous recordings from the surface were made for comparison. A cathode ray oscillograph was used in occasional cases with either surface or needle electrode technic. Further details of the technic have been previously described.¹²

Patients with poliomyelitis have been studied during the acute, convalescent and late stages. The muscular activity was investigated with the extremities in positions of maximum relaxation, during passive stretching and voluntary and reflex contraction. Preliminary assays of the effects of physical therapeutic agents on muscle irritability were also done. Comparisons have been made with the electromyographic findings from patients with infectious polyneuritis, peripheral nerve injuries and muscle spasm secondary to fractures.

RESULTS

Muscles in positions of relaxation: In patients with acute poliomyelitis when careful efforts were made to secure positions of comfort and relaxation, only rarely were spontaneous discharges recorded from muscles. Normal muscle also exhibits no electrical activity under similar conditions.⁴ When spontaneous discharges were present they appeared in the muscles which were weakened, but not completely paralyzed. Other muscles although not weakened or paralyzed were often relaxed only with difficulty and gave rise to electrical discharges when under minimal tension. This was particularly true of the posterior neck muscles.

In the convalescent stages, coincident with improvement in motor power of the affected muscles spontaneous discharges were found to be a striking feature of the electromyograms. High voltage diphasic spikes with

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arrhythmic frequencies, varying from five to 10 per second appeared intermittently at this time and were similar in pattern to those recorded from muscles during the regenerative period following peripheral nerve injury.¹¹ The degree of this spontaneous electrical activity was roughly correlated with the extent of the recovery of motor power and the improvement in electrical excitability as measured by strength-duration curves. When recovery was complete or had ceased this electrical activity greatly diminished or was absent.

Completely paralyzed muscles showed no electrical activity on the ink writing oscillograph since the fibrillations of denervation produce potentials of too short duration to be definitely recognized by this method; they can however be recorded by the cathode ray oscillograph.

Passive Stretching of muscles: In normal individuals passive stretching of muscles results in electrical discharges only when the movement is quick and vigorous, and the discharges cease when the stimulus is discontinued.^{4,11} In acute poliomyelitis widespread irritability to stretching has been described in muscles showing little or no paralysis.⁹ In our cases which were studied more thoroughly in the third to twelfth week the irritability to stretching was more marked in those muscles which were partially paralyzed and which exhibited spontaneous discharges at rest. There was no consistent correlation between clinical signs of "spasm" (such as tenderness and pain on stretching) and the electrical evidence of irritability, except in the first few days of the illness when the clinical signs of meningeal irritation could be elicited.

The pattern of electrical discharges produced by stretching resembled in appearance that obtained from muscles in a state of tonic contracture or spasm secondary to a fracture of the extremity.¹⁰

During the period of recovery of motor power the spontaneous discharges from resting muscles were increased in voltage and frequency when the muscles were actively or passively stretched. This increased electrical activity persisted for several seconds after the stretch had been discontinued. The irritability to stretching diminished or disappeared at the same time as the resting discharges. No abnormal irritability was found in old cases with contractures and shortened muscles.

Voluntary contraction: Electromyograms were recorded from pairs of opposing muscles performing simple flexion and extension of a joint, with and without resistance. The voltage of these discharges was proportional to the muscle strength and served as a measurement of the rate of recovery. There was no constant correlation between the voltage of action potentials and the amount of spontaneous electrical activity at rest. In general there was an inverse relationship. The weaker muscles gave rise to more resting discharges than the less affected ones and as strength approached normality, resting potentials diminished and the action potentials increased.

These electromyograms of working muscles were also used to study reciprocal innervation of antagonistic muscles. The patients so tested had received training in muscle reeducation with specific attempts to teach control of individual muscles in order to obtain smooth, rhythmic, well coordinated movements. In spite of this train-

ing, in patients with partially paralyzed extremities, a nearly universal finding was the simultaneous activation of opposing muscles. This occurred even with minimal movements and could be recorded electrically when not detectable clinically. In addition to gross simultaneous discharges in opposing muscles, synchrony of the individual diphasic potentials was also observed. Simultaneous activation of opposing muscles without synchrony of individual action potentials can be duplicated in normals by voluntary attempts to do so and is often present to a slight degree during apparently well coordinated movements. The poliomyelitis patients, however, could not overcome this simultaneous activation until motor power had returned to nearly normal. Synchronization of the individual action potentials however, could never be reproduced by normals. Its appearance in poliomyelitis patients was associated with a loss of strength greater than about 25 per cent. In cases with persistent weakness, synchronous discharges were observed as long as fifteen years after the onset of the disease. These findings suggest a marked disruption of normal reciprocal innervation which will be discussed in more detail later.

Reflex contractions: In order to detect abnormalities of motor innervation at a level higher than the lower motor neuron, the myotatic stretch reflex was investigated. Electromyographic recordings were taken from the biceps, triceps, quadriceps and gastrocnemius muscles while their reflex activity was tested in the usual manner by tapping the respective tendons with a rubber hammer. In severely involved extremities electromyographic evidence of reflexes could often be recorded when no contraction could be noted clinically. A common finding was spread of a reflex response to the contralateral extremity. In some cases the double response could be obtained from right to left or vice versa; in others only in one direction. Occasionally the voltage of the discharge was greater in the extremity opposite the one percussed, particularly if the latter was more severely weakened. No clinical signs of an upper motor neuron lesion were elicited in any of these cases and there was no spread of reflex activity from upper to lower extremities.

EFFECTS OF THERAPEUTIC AGENTS ON MUSCLE IRRITABILITY

Luminous Heat: Preliminary studies on a small number of patients with poliomyelitis indicated that the irritability of the most sensitive muscles to passive stretching was reduced by thirty minutes irradiation from a 500 watt incandescent bulb. The voltage discharged as quantitated electromyographically was decreased by this treatment and in some instances an increase in joint range of 10 to 20 degrees was effected.

Diathermy: In some of the same cases the tests were repeated using short wave diathermy, induction cable technic, for twenty minutes. In no instance was any electromyographic or clinical improvement noted and in one patient the muscle irritability was increased.

Hot Packs: The effect of Kenny type of hot packs applied for thirty minutes was also measured by this technic on the same patients. No significant changes in the electromyographs were recorded. Slight increases and decreases in irritability were found and in only one

case was the joint range increased.

Prostigmin Therapy: Intramuscular injections of prostigmin (1.6 mg.) were given on ten occasions to five of these patients with poliomyelitis. The same electromyographic tests of irritability were studied in the same muscles as on other occasions with thermotherapy. In none of the patients did any significant alteration result from this treatment.

Oral prostigmin bromide was also given in dosages amounting to 15 milligrams t.i.d. for periods of two or three weeks. Again no lessening of irritability was detected electromyographically. One case improved clinically while taking the drug, but the same progress continued after the medication was discontinued.

INTERPRETATION OF RESULTS

These electromyographic studies suggest that there are at least two different types of abnormal muscle irritability present in patients with poliomyelitis. In the acute stage when signs of meningeal irritation were present, minimal changes in position and moderate passive stretching produced electrical discharges similar in pattern to those recorded from muscles in spasm secondary to a painful condition of the extremity, such as a recent fracture or arthritis. It is likely that this type of muscular behavior represents protective reflex spasm in response to pain or irritation of sensory nerves.

The electrical discharges from relaxed nonpainful muscles produced a different pattern in the electromyogram, which could be differentiated easily. This type of electrical activity was found only in muscles with at least 25 per cent loss of motor power, but not complete paralysis. Its presence seems dependent on the state of partial innervation of a given muscle as similar discharges are seen in progressive muscular atrophy and from muscles during regeneration of nerves following peripheral injuries or polyneuritis. Although this phenomenon has been observed during degeneration as well as regeneration, in poliomyelitis its appearance coincided with clinical evidence of improving motor power and increasing electrical excitability. The origin of these resting potentials is not known. It may be due to some peripheral disorder of the nerve in its intramuscular portion as is probable in progressive muscular atrophy or it may indicate discharges of hyperirritable anterior horn cells, or both. Experimental studies similar to those done in progressive muscular atrophy¹³ will be necessary to elucidate this problem.

A third type of hyperirritability is reflex in character, and more nearly resembles the familiar spasticity of upper motor neuron lesions. In the poliomyelitis patients, however, the hyperreflexia obtained only in the segment stimulated, with spread to the contralateral extremity and not to higher or lower segments as in the more familiar type of spasticity from cerebral lesions. Furthermore, the spasticity is not recognized clinically as such, but only detected by sensitive electrical recordings. A possible mechanism for this finding lies in the diminution or absence of an inhibitory effect transmitted through internuncial cells. These cells have been reported as damaged in poliomyelitis as well as the anterior horn cells.¹⁴

It seems probable that all three of these hypothesized mechanisms of producing hyperirritability in poliomyelitis may function to varying degrees at different stages of the disease. In the acute stage of meningeal irritation the protective reflex spasm initiated by sensory stimuli would predominate. This tends to disappear spontaneously and probably also in response to hot applications. The second type of irritability appears later during recovery of motor power and is little influenced by physical therapeutic measures. The third type of mechanism might function at any period, the extent to which it is manifest being dependent on the relative degree of destruction of the internuncial and anterior horn cells. If the pathologic changes were predominantly in the internuncial cells considerable spasticity of this type might be expected, whereas predominant anterior horn cell destruction would lead to hyporeflexia. One would expect only slight effect from heat applied to the muscles, as this disorder concerns central transmission of impulses. Drugs which influence spinal cord synapses might prove effective in altering this condition. Muscle reeducation may also be of benefit in teaching more efficient use of available neurons.

Our attempts to study the effects of therapeutic agents are at present too incomplete to warrant conclusions. Very early cases have not been adequately investigated as yet and the number of cases studied is limited. It is interesting to note, however, that from the present data hot packs hold no advantage over other methods of applying thermotherapy.

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arrhythmic frequencies, varying from five to 10 per second appeared intermittently at this time and were similar in pattern to those recorded from muscles during the regenerative period following peripheral nerve injury.¹¹ The degree of this spontaneous electrical activity was roughly correlated with the extent of the recovery of motor power and the improvement in electrical excitability as measured by strength-duration curves. When recovery was complete or had ceased this electrical activity greatly diminished or was absent.

Completely paralyzed muscles showed no electrical activity on the ink writing oscillograph since the fibrillations of denervation produce potentials of too short duration to be definitely recognized by this method; they can however be recorded by the cathode ray oscillograph.

Passive Stretching of muscles: In normal individuals passive stretching of muscles results in electrical discharges only when the movement is quick and vigorous, and the discharges cease when the stimulus is discontinued.^{4,11} In acute poliomyelitis widespread irritability to stretching has been described in muscles showing little or no paralysis.⁹ In our cases which were studied more thoroughly in the third to twelfth week the irritability to stretching was more marked in those muscles which were partially paralyzed and which exhibited spontaneous discharges at rest. There was no consistent correlation between clinical signs of "spasm" (such as tenderness and pain on stretching) and the electrical evidence of irritability, except in the first few days of the illness when the clinical signs of meningeal irritation could be elicited.

The pattern of electrical discharges produced by stretching resembled in appearance that obtained from muscles in a state of tonic contracture or spasm secondary to a fracture of the extremity.¹⁰

During the period of recovery of motor power the spontaneous discharges from resting muscles were increased in voltage and frequency when the muscles were actively or passively stretched. This increased electrical activity persisted for several seconds after the stretch had been discontinued. The irritability to stretching diminished or disappeared at the same time as the resting discharges. No abnormal irritability was found in old cases with contractures and shortened muscles.

Voluntary contraction: Electromyograms were recorded from pairs of opposing muscles performing simple flexion and extension of a joint, with and without resistance. The voltage of these discharges was proportional to the muscle strength and served as a measurement of the rate of recovery. There was no constant correlation between the voltage of action potentials and the amount of spontaneous electrical activity at rest. In general there was an inverse relationship. The weaker muscles gave rise to more resting discharges than the less affected ones and as strength approached normality, resting potentials diminished and the action potentials increased.

These electromyograms of working muscles were also used to study reciprocal innervation of antagonistic muscles. The patients so tested had received training in muscle reeducation with specific attempts to teach control of individual muscles in order to obtain smooth, rhythmic, well coordinated movements. In spite of this train-

ing, in patients with partially paralyzed extremities, a nearly universal finding was the simultaneous activation of opposing muscles. This occurred even with minimal movements and could be recorded electrically when not detectable clinically. In addition to gross simultaneous discharges in opposing muscles, synchrony of the individual diphasic potentials was also observed. Simultaneous activation of opposing muscles without synchrony of individual action potentials can be duplicated in normals by voluntary attempts to do so and is often present to a slight degree during apparently well coordinated movements. The poliomyelitis patients, however, could not overcome this simultaneous activation until motor power had returned to nearly normal. Synchronization of the individual action potentials however, could never be reproduced by normals. Its appearance in poliomyelitis patients was associated with a loss of strength greater than about 25 per cent. In cases with persistent weakness, synchronous discharges were observed as long as fifteen years after the onset of the disease. These findings suggest a marked disruption of normal reciprocal innervation which will be discussed in more detail later.

Reflex contractions: In order to detect abnormalities of motor innervation at a level higher than the lower motor neuron, the myotatic stretch reflex was investigated. Electromyographic recordings were taken from the biceps, triceps, quadriceps and gastrocnemius muscles while their reflex activity was tested in the usual manner by tapping the respective tendons with a rubber hammer. In severely involved extremities electromyographic evidence of reflexes could often be recorded when no contraction could be noted clinically. A common finding was spread of a reflex response to the contralateral extremity. In some cases the double response could be obtained from right to left or vice versa; in others only in one direction. Occasionally the voltage of the discharge was greater in the extremity opposite the one percussed, particularly if the latter was more severely weakened. No clinical signs of an upper motor neuron lesion were elicited in any of these cases and there was no spread of reflex activity from upper to lower extremities.

EFFECTS OF THERAPEUTIC AGENTS ON MUSCLE IRRITABILITY

Luminous Heat: Preliminary studies on a small number of patients with poliomyelitis indicated that the irritability of the most sensitive muscles to passive stretching was reduced by thirty minutes irradiation from a 500 watt incandescent bulb. The voltage discharged as quantitated electromyographically was decreased by this treatment and in some instances an increase in joint range of 10 to 20 degrees was effected.

Diathermy: In some of the same cases the tests were repeated using short wave diathermy, induction cable technic, for twenty minutes. In no instance was any electromyographic or clinical improvement noted and in one patient the muscle irritability was increased.

Hot Packs: The effect of Kenny type of hot packs applied for thirty minutes was also measured by this technic on the same patients. No significant changes in the electromyographs were recorded. Slight increases and decreases in irritability were found and in only one

case was the joint range increased.

Prostigmin Therapy: Intramuscular injections of prostigmin (1.6 mg.) were given on ten occasions to five of these patients with poliomyelitis. The same electromyographic tests of irritability were studied in the same muscles as on other occasions with thermotherapy. In none of the patients did any significant alteration result from this treatment.

Oral prostigmin bromide was also given in dosages amounting to 15 milligrams t.i.d. for periods of two or three weeks. Again no lessening of irritability was detected electromyographically. One case improved clinically while taking the drug, but the same progress continued after the medication was discontinued.

INTERPRETATION OF RESULTS

These electromyographic studies suggest that there are at least two different types of abnormal muscle irritability present in patients with poliomyelitis. In the acute stage when signs of meningeal irritation were present, minimal changes in position and moderate passive stretching produced electrical discharges similar in pattern to those recorded from muscles in spasm secondary to a painful condition of the extremity, such as a recent fracture or arthritis. It is likely that this type of muscular behavior represents protective reflex spasm in response to pain or irritation of sensory nerves.

The electrical discharges from relaxed nonpainful muscles produced a different pattern in the electromyogram, which could be differentiated easily. This type of electrical activity was found only in muscles with at least 25 per cent loss of motor power, but not complete paralysis. Its presence seems dependent on the state of partial innervation of a given muscle as similar discharges are seen in progressive muscular atrophy and from muscles during regeneration of nerves following peripheral injuries or polyneuritis. Although this phenomenon has been observed during degeneration as well as regeneration, in poliomyelitis its appearance coincided with clinical evidence of improving motor power and increasing electrical excitability. The origin of these resting potentials is not known. It may be due to some peripheral disorder of the nerve in its intramuscular portion as is probable in progressive muscular atrophy or it may indicate discharges of hyperirritable anterior horn cells, or both. Experimental studies similar to those done in progressive muscular atrophy¹³ will be necessary to elucidate this problem.

A third type of hyperirritability is reflex in character, and more nearly resembles the familiar spasticity of upper motor neuron lesions. In the poliomyelitis patients, however, the hyperreflexia obtained only in the segment stimulated, with spread to the contralateral extremity and not to higher or lower segments as in the more familiar type of spasticity from cerebral lesions. Furthermore, the spasticity is not recognized clinically as such, but only detected by sensitive electrical recordings. A possible mechanism for this finding lies in the diminution or absence of an inhibitory effect transmitted through internuncial cells. These cells have been reported as damaged in poliomyelitis as well as the anterior horn cells.¹⁴

It seems probable that all three of these hypothesized mechanisms of producing hyperirritability in poliomyelitis may function to varying degrees at different stages of the disease. In the acute stage of meningeal irritation the protective reflex spasm initiated by sensory stimuli would predominate. This tends to disappear spontaneously and probably also in response to hot applications. The second type of irritability appears later during recovery of motor power and is little influenced by physical therapeutic measures. The third type of mechanism might function at any period, the extent to which it is manifest being dependent on the relative degree of destruction of the internuncial and anterior horn cells. If the pathologic changes were predominantly in the internuncial cells considerable spasticity of this type might be expected, whereas predominant anterior horn cell destruction would lead to hyporeflexia. One would expect only slight effect from heat applied to the muscles, as this disorder concerns central transmission of impulses. Drugs which influence spinal cord synapses might prove effective in altering this condition. Muscle reeducation may also be of benefit in teaching more efficient use of available neurons.

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tion, favors a peripheral mechanism such as has been proven in the mass contractions of facial muscles.¹⁵

The improvement in motor power usually observed in poliomyelitis is commonly thought to be due to muscular hypertrophy in unaffected motor units. The electromyograms suggest, however, that there may also be some degree of recovery in partially destroyed motor units as the pattern of electrical discharges is the same as seen in muscles during nerve regeneration. Further and more definite evidence of a recovery process in affected motor units is obtained from the finding of improving electrical excitability as measured by voltage-capacity curves, coincident with electromyographic and clinical signs of increasing muscle function.

CONCLUSIONS

Electromyographic recordings are of value in the study of muscular dysfunction in poliomyelitis.

On the basis of these recordings three types of abnormal neuromuscular hyperirritability have been described.

Disorders of normal reciprocal innervation of musculature during voluntary movement have been observed and their mechanism discussed.

Evidence of a recovery process of the motor unit was found.

Preliminary studies indicated that this method of investigation is useful in evaluating therapeutic agents.

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The Physiology of the Spinal Cord with Relation to Poliomyelitis*

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THE problem of diagnosis and treatment of infantile paralysis leads immediately to the physiology of the spinal cord. It is imperative that a full understanding not only of the normal physiological mechanisms of the spinal cord and their relations to muscle effectors and to cutaneous and other receptors be achieved if we are to deal effectively with the disease, but those aberrations of function consequent upon the altered or pathological anatomy of the diseased cord must also be revealed. Unfortunately we are very far from that goal. Should one judge the present position of spinal physiology by the weight of the accumulated literature, an optimism not in keeping with the facts would be engendered. It will be the purpose of the following discussion to describe work along these lines now in progress in this laboratory and to examine critically some of

THE EXPERIMENTAL DISEASE

For physiological research in which large series of infected individuals must be observed and subjected to

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the recent advances made in the field of neuro-physiology. various instrumental procedures recourse to an experimental animal is necessary. Experimentation must always be followed by pathological analysis of autopsy material, a sequence difficult in human studies. It is imperative also that the time course of the disease be controllable. Animals infected with human strains of the poliomyelitis virus are not entirely satisfactory. Considerable variation exists among the various monkey species as to their susceptibilities and their pathological reactions to the disease.¹ The chimpanzee, which will never be available for large scale study, seems to be the only species which closely resembles man in its relation to the virus of poliomyelitis. Because the host parasite-relations of the virus diseases are such that the pathology seems to depend nearly as much on the host as on the infective agent itself, we have chosen herpes simplex infection in rabbits for study solely on the basis of the similarity of the symptomatology and the pathological anatomy of the disease to infantile paralysis. The classical papers of Goodpasture and Teague^{2,3} have formed the basis for our work. It is our belief that we have an extremely close

parallel to human poliomyelitis in all of its manifestations in this disease.

Injection of infective doses of this virus into the rectus femoris muscle of one thigh has proved to be the most useful method of inoculation. This produces one of the three following sequences. (1) The animal shows no symptoms whatsoever. (2) Clear symptoms appear only to recede as the animal makes a recovery. (3) The pathology induced is of progressive nature. It spreads from the inoculated limb to the hindlimb of the opposite side and then up the cord to the forelimb and to the brain. The animal finally succumbs to respiratory involvement or to severe encephalitis.

At this stage in our studies only those animals in the second and third categories have been investigated, namely those groups with frank clinical symptoms. The course of these clinical conditions resembles closely those described for infantile paralysis. Table 1 shows a synopsis of the clinical findings.

TABLE 1.

- Symptoms:
1. Hyperreflexia
 2. Fever
 3. Evidences of pain
 4. Muscular dysfunction
 - a. Weakness
 - b. Posture
 - c. Gait
 - d. Paralysis
 - e. Fasciculation
 5. Labyrinthine and other cerebral symptoms.

The Symptomatology. The most constant early symptom is the hyperreflexia which occurs as the first aberration in all the animals that become ill. This lasts from one to three days and is followed by a fever. The normal temperature of rabbits varies from 103.0° to 104.0°. In the febrile state of this infection it may rise to as high as 108°. Where paralysis becomes severe, subnormal temperatures usually follow but these may be due to the inactive state of the animals and to cooling induced by lying on the cage floor.

Muscular weakness, abnormal posture, alterations of gait, and frank paralysis follow the fever. These motor disturbances are probably all related and seem to differ only quantitatively from one another. Thus the paralysis is the most revealing of the group. It can not be described as flaccid or spastic. Instead it shows some of the properties of each. The constant feature is the inability of the animal to use the affected limb for purposeful movements. When the paralysis is severe, the animal lies prostrate on the affected side. But the reflexes, both proprioceptive (knee jerk) and cutaneous (flexor) may be elicited and never seem to disappear. Though the animal is quite unable to use the limb under ordinary circumstances, intense stimulation of a painful nature causes a temporary improvement and the animal will take a few normal steps with the leg, perfectly integrated with the other limbs, before again showing the paralysis. This interesting phenomenon has been described by Tower⁴ in her study of pyramidal lesion in the monkey and I⁵ have reported the same thing in hagfish paralyzed by spinal section. We have looked upon this paralysis as a selective loss of the behavior pattern and one which is yet undescribed in the clinical literature.

The alteration of gait is a milder form of the paralysis and, in the progressive cases, gives way to it. The com-

ponents of normal stepping behavior become dissociated in the affected limb and the animal may fail to protract the limb at the proper time, thus letting it drag behind. Or the leg may be held in some posture which is a part of the stepping act, such as protraction, causing the foot to slide uselessly along the floor. These alterations go into one another easily and the general state of excitement of the animal is the controlling factor.

Actual weakness of the affected limb when walking is quite apparent even in the mild cases. It is not evident upon simple examination, however, for as mentioned before the reflexes persist and resistance to passive movement may be normal. Transient flaccidity of muscle groups has been noted but has not been worked out sufficiently to warrant comment.

Interesting evidences of pain have been seen in certain animals. One of these invariably whimpered when the affected limbs were manipulated. In several other rabbits, clear avoidance reactions were seen which indicated pain. In our opinion, pain is a frequent concomitant of the motor disorders.

Higher Centers. In severe cases the paralysis progresses from the inoculated hindlimb to the opposite one and thence forward along the spinal cord to the brain. The most sensitive part of the brain seems to be the labyrinthine nuclei for abnormal postures of the head and neck followed by disturbances of equilibrium are very constant. Dyspnea usually occurs but in the animals watched at this stage it has always been of several days duration before giving way to respiratory failure.

Fasciculation. Fasciculation in the muscles of the limbs, back, and especially of the face are seen regularly in the severe cases. In one animal where it was especially widespread, the application of heat abolished the twitching. The matter has not, however, been pursued further.

Involuntary Muscle Involvement. Only in the late stages of the disease does one see incontinence of the urethral and anal sphincters.

PATHOLOGICAL FINDINGS ‡

TABLE 2

- Pathological Findings:
1. Meningeal infiltration
 2. Inflammatory reaction
 - a. Perivascular "cuffing"
 - b. Diffuse infiltration of small mononuclears
 - c. Infiltration with large mononuclears
 - (1). Softening
 - (2). Cavitation
 3. Degenerative changes in neurons
 - a. Chromatolysis
 - b. Neuronophagia
 - c. Pyknosis

Meninges. Meningeal involvement is nowhere severe, but some abnormality is a constant finding. Both perivascular and diffuse infiltration of the arachnoid with mononuclear cells are seen.

Inflammatory Changes. These are constantly present and occur in a great range of severity. Slight perivascular infiltration with small monocyctic cells is the mildest form of the inflammatory reaction. When more severe, the infiltration may extend beyond the perivascular spaces and may include large monocytes (macrophages) as well as the smaller. This may go on into enormous accumulations of large monocytes with the formation of cavities

‡ In the preparation of this section I have been assisted by Mr. Robert A. Good.

in the white matter. Proliferation of the endothelium of the blood vessels has been seen.

Changes in the Anterior Horn Cells. The changes in the motor cells of the spinal cord are of greatest complexity. There is little constancy of the changes from one cell to another in a given nucleus. Ghost-like remains of neurons surrounded by several glial cells show the final stage. Cells still intact but shrunken and in the process of destruction are evident. In the cells retaining normal volume, the Nissl substance varies from a condition of complete lysis through patchy types of perinuclear chromatolysis to the normal condition. Some cells are conspicuously heavily stained and packed with rounded rather than the normally angular Nissl bodies. Rounding of the chromatolyzed cells is common and eccentric nuclei are conspicuous. We have at present no evidence to indicate which of these processes are reversible and which are not.

Internuncial Cells. Destruction of the internuncial cells is to be found in every cord examined. All of the types of chromatolysis as well as the nuclear displacement and the neuronophagia seen in the motor cells are found in the intrinsic cells of the spinal cord.

White Matter. The invasion of the white substance of the cord, mentioned under inflammatory changes, produces in the severely attacked regions a considerable loss of nerve fibers. Cavities have been found in the lateral columns. Heavy infiltrations of macrophages occur commonly in the ventral lateral regions.

Correlation of Pathology and the Severity of the Lesions. As in infantile paralysis, there is a confusing lack of correlation between the clinical symptoms and the pathological findings. One animal which showed a transient fever and a temporary hyperreflexia showed every type of pathological change enumerated above, though the animal was considered "recovered" at the time it was killed.

PHYSIOLOGICAL STUDIES

Instrumentation. Our knowledge of the spinal cord has been advanced recently by the use of the cathode-ray oscillograph. The instrument has no time lag and is useful in recording activity both in the peripheral nervous system and within the spinal cord itself. With it one is able to determine the complexity of reflex pathways and to measure the excitability of the horn cell. We have undertaken a study of the normal and infected spinal cord with this instrument and have reported^{6,7} some of the alterations of function which are found in the abnormal cell.

Physiology of the Chromatolyzed Neuron. Chromatolysis, which is so widespread in infantile paralysis and in herpetic rabbits can be produced in the anterior horn cells by cutting their axons either at the ventral root or in the peripheral nerve. Because of the simplicity of this procedure we undertook a study of the reactions of the chromatolyzed cell. Cats and monkeys were used in the experiments and it was possible to use a normal side of the spinal cord as a simultaneous control for the degenerated side. After ten or more days had been allowed for the cell changes to develop, oscillographic records of the segmental reflexes were made.

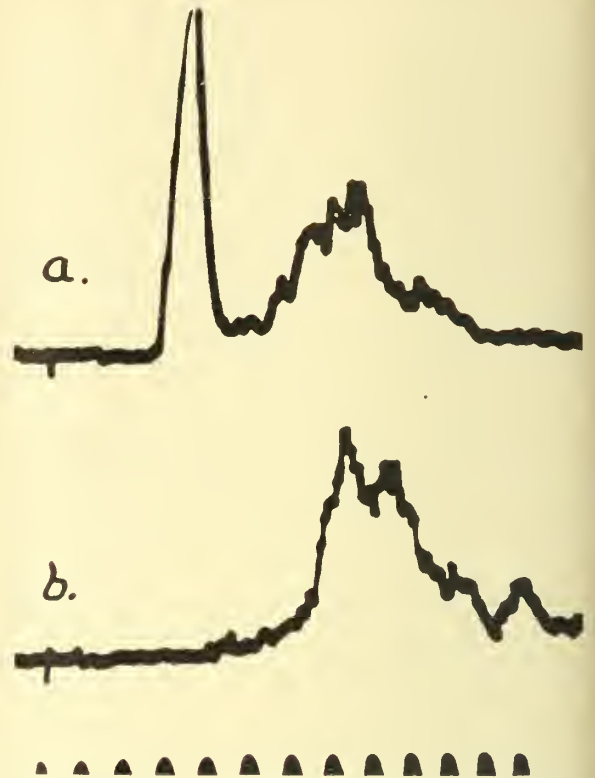


Fig. 1. Potentials recorded from 7th lumbar ventral root in a cat which had had the right sciatic nerve cut 12 days previously. The stimulus was in each case a single condenser discharge to the dorsal root. (a) left side; (b) right side. Time, in thousandths of a second. (Reproduced from *Science*, vol. 98, p. 115.)

The Normal Segmental Reflex. Recent work of Lloyd⁸ has shown that the direct or two-neuron⁹ reflex is proprioceptive in nature while cutaneous reflex pathways are longer and result in reflex discharges of a greater latency. In Fig. 1a is shown the reflex return recorded from the seventh lumbar ventral root of a cat in response to stimulation of the normal tibial nerve. As the nerve has both proprioceptive and cutaneous sensory components, reflexes of both types are recorded. The shock artefact, which indicates the moment at which a single condenser discharge was delivered to the tibial nerve is followed in a little less than three milliseconds by a high but short-lived peak. This is the proprioceptive reflex. The second reflex peak, with a latency of five milliseconds is the cutaneous response and characteristically is less abrupt than the first. It must be borne in mind that the same motor neurons mediate these two reflexes.

The Response of the Chromatolyzed Cell. On the side which had been subjected to peripheral nerve section (Fig. 1b), a striking change is to be seen. The cells respond normally to the cutaneous component of the stimulated nerve but not at all to the proprioceptive stimulation. It was possible to prove that transmission past the dorsal root ganglion cell was unaffected by the retrograde changes. Thus the conclusion can be drawn that the visible pathological state of the cell is related directly or indirectly to its ability to conduct reflex activity.

The importance of these findings to the problem at hand is clear. Cells which are in pathological states may

not be assumed normal in their conducting properties. On the other hand, because the cutaneous reflex was found not to be disturbed, they certainly are capable of some activity. That the cells show selective loss of conduction of one form of reflex (proprioceptive) and not another (cutaneous) makes entirely possible the supposition that the hypersensitivity and the hyposensitivity of the infected cord may be explained on alterations of the ventral horn cells alone. At this time our study of the cells attacked by the virus is not sufficiently advanced to contribute to this discussion. However, now that the experimental disease has become standardized, we expect to concentrate heavily on this phenomenon.

DISCUSSION

It is tacitly assumed in the text books as well as many clinical discussions that the present basis of our knowledge of spinal cord physiology is both sound and adequate for the understanding of motor disorders. This is an illusion against which we must be on guard. The recent findings in neurophysiology have proven so unexpected and so inexplicable with the current doctrines, that a complete turn about in neurological thought is now imminent.

The discovery of dorsal root reflexes by Toennies¹⁰ was perhaps the first warning of this change. That fibers which had always been thought to be purely afferent in nature, return an efferent volley when stimulated has been amply corroborated¹¹ but, significantly, the place of the dorsal root reflex in normal or diseased physiology has never been determined. The stimulation of an intact nerve fiber by the passage of impulses in its neighbors has been shown by Katz and Schmidt.¹² This approach has been carried further by Renshaw¹³ who demonstrated the passage of activity from one anterior horn cell to another. Of great interest also is the proof given by Lloyd¹⁴ that inhibition in the spinal cord is not the summation of subnormality of previously active pathways, but is directly transmitted from one cell to another. He has shown that, unlike activation, a "synaptic delay" does not intervene between the arrival of the impulse and its inhibitory effect on the motor cell. His evidence that one fiber can serve as an activator of one motor cell and an inhibitor of another is overwhelming. Thus the theory of the synapse as conceived by Lucas¹⁵ and last developed by Lorente de No¹⁶ has become inadequate for the explanation of the known facts of interneuronal transmission. Recently an old hypothesis of the bipolar neuron has been revived by Gesell¹⁷ and seems more adequate than any yet propounded.

Not only is the process of interneuronal transmission being re-investigated in a new light, but we are losing the use of one of the most convenient of the clinical dogmas, namely the upper motor neuron lesion. The view that spastic paralysis was indicative of cortical spinal injury dates back to the time when the pyramidal pathway was nearly the sole descending motor pathway about which any knowledge existed. The spasticities following internal capsule lesions were considered adequate proof of the inhibitory nature of this pathway and upper motor neuron lesion became a favorite phrase of both physiologist and clinician. Lassek^{17a} has reinvestigated the matter of internal capsule hemorrhage and has shown that "cortical signs" and cortico-spinal pathway injury are not related. The monumental study of Tower has demonstrated conclusively that spasticity is not

caused by pyramidal tract lesions. We owe to Mettler¹⁸ and others,¹⁹ the recent proof that lesions involving motor nuclei and tracts of the cortical and subcortical regions of the brain are extraordinarily complex and not to be grouped under a single syndrome. Thus in a most valuable discussion of flexor spasms and mass reflexes, the late Professor Coghill²⁰ has demonstrated the importance of the spinal mechanisms in spastic states. He has drawn heavily on the descriptions of Head²¹ and Riddoch²² of integrated activity of spinal man and upon the work of his own students and others who have shown the amazing potentialities of the spinal cord. Certain mass reflexes which have been described in human poliomyelitis are to be explained only on the basis of Coghill's behavioral concept as opposed to the reflex conception of the Sherringtonian school. The variation of paralysis with the general state of excitement, which I described above, fits into the discussion at this point for it seems to indicate the necessity of introducing the concept of the organism-as-a-whole into the consideration of paralyses and spinal dysfunctions.

SUMMARY

In the preceding pages I have given a resumé of work now under way in this laboratory. The standardization of an experimental disease, closely paralleling infantile paralysis in its clinical and microscopic pathology is described. Work which relates visible changes in nerve cells to altered reflex function is summarized. A critical survey of the present state of our knowledge of the physiology of the spinal cord has been attempted. This has shown certain inadequacies of the current working hypothesis and that our knowledge of the basic facts of interneuronal transmission and motor integration is as yet meager.

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Metabolism of Nervous Tissue in Poliomyelitis*

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FUNDAMENTALLY all processes of life have a chemical basis; likewise, the disturbances in these processes during disease are in the final analysis biochemical and, in principle at least, may be explained in these terms. Our comprehension of the biochemistry of the life processes is not adequate, however, to permit such an explanation at the present time.

Aside from the investigations of Kabat and his collaborators, only one report, by Brodie and Wortis,¹ has been found in which experiments were attempted to compare directly the biochemistry of the nervous tissue from animals infected with poliomyelitis with that of normal animals. The investigations of poliomyelitis have centered on the treatment and rehabilitation of the poliomyelitis patient, in studying the epidemiology, the pathology and immunology of the disease, and in investigating the properties of the virus by determining size by filtration and centrifugation methods and by attempts at purification.

There are, of course, reasons why biochemical investigations have been neglected. The only animal available for experimentation was the monkey, and background studies were needed before the methods were developed sufficiently to be adaptable to biochemistry. The more direct problems, those applying to treatment of the disease, naturally received first attention.

The time is now ripe, however, for the biochemical studies. The murine strain of virus² has been developed so that an inexpensive animal may be infected with poliomyelitis. The methods of transmission of the disease are well in hand. Progress is being made in purification of the virus, and before long the study of the effects of pure virus on biochemical reaction may be initiated. Advance has been rapid in the field of biochemistry, and there are many procedures which at present await only a sufficient number of workers to apply them.

An attractive hypothesis is that the virus acts by disturbing the enzymic functions of the cell.³ The enzymic processes of the cell are many, however, and the problem of hitting upon the right one will be difficult. The enzyme may be concerned with synthesis of some essential structure in the cell, e. g., a nucleoprotein, it may be necessary for a reaction which yields energy to the cell, e. g., phosphorylation, or for a reaction which is important in maintaining the permeability character of an essential cell membrane. Carbohydrate metabolism, fat metabolism, protein metabolism, and mineral metabolism all will need to be under scrutiny. There may not be immediate returns on poliomyelitis as such, but the investigation will involve fundamental experiments in physiology and biochemistry and the results are certain to be of interest and profit.

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EXAMPLES OF VITAL PROCESSES WHICH THE VIRUS MAY ATTACK

In the past few years rapid progress has been made in the field of carbohydrate metabolism. The mechanism of muscle glycolysis has been studied in detail by Meyerhof, Lundsgaard, Parnas, Warburg, Cori and others. The applicability of this scheme to glycolysis by brain is not completely established, but the proof is becoming convincing.⁴

The respiratory quotient of brain *in vivo* approximates unity. Furthermore, the decrease in glucose and oxygen between arterial and cerebral venous blood is practically equivalent: i. e., assuming complete oxidation of the glucose to CO₂. It is apparent that glucose oxidation is quantitatively the most important respiratory process in brain *in vivo*. It is the fuel of the brain. The effect of the virus and infection on the specific intermediary reactions of carbohydrate metabolism must certainly be investigated, for these reactions are a vulnerable part of the cell metabolism, especially the reactions of the phosphorylated compounds, such as adenosinetriphosphate, which serve as the energy transmitters in carbohydrate metabolism.⁵

The details of oxidative mechanisms have been extensively studied by Keilin, Szent-Györgyi, Theorell, Krebs and others.^{6,7} Brain contains a cytochrome oxidase system which brings about the activation of oxygen. Cyanide, an inhibitor of the cytochrome oxidase system, blocks almost completely the oxygen uptake by brain. Apparently cytochrome oxidase is quantitatively the most important of the oxygen activators in brain. The dehydrogenases "pull off" hydrogen from the substrates which are oxidized. This hydrogen is transported to the cytochrome oxidase system by carriers—in reality vitamins that have been transformed into co-enzymes. Here then is a long series of interlinked reactions, each of which is essential in the oxidative process. The importance of determining the effect of the virus and infection on each link of this system is obvious.

Besides the mechanism of hydrogen transport and oxygen activation there are reactions which lead to cleavage of the carbon chain, ultimately to carbon dioxide. Krebs and others have presented evidence that this cleavage is accomplished in muscle and liver by a cycle of reactions. A four-carbon compound, oxalacetic acid, unites with the compound that is to be oxidized. Step by step this combination passes through stages of oxidation. One carbon at a time is split off as carbon dioxide along the course of the reaction, until finally only four carbons remain as oxalacetic acid. The acid is ready then to again pick up another molecule and carry it through the cyclic splitting process. It is not clear to us yet whether such a cycle occurs in brain, but it is clear that there is a mechanism for splitting the carbon chain to carbon dioxide. In such a cycle there is ample chance for disruption of an important link by the virus.

The possible interference of the virus in mechanisms of transmission of impulses in the nerve are of interest. Acetylcholine is a likely mediator in these reactions. The mechanism of synthesis of acetylcholine^{8,9} and the role of cholinesterase and phosphorylating reactions in nerve transmission have received recent study and emphasis.¹⁰

The above examples give an indication of the type of biochemical measurements that are ready for tests with the virus. Because these reactions are vital to cellular metabolism, the profound effect of the virus would be accounted for.

ANAEROBIC GLYCOLYSIS

Preliminary investigations of the effect of poliomyelitis virus on carbohydrate metabolism of the brain have been started. Racker and Kabat have investigated the rate of formation of acid from glucose by minced mouse brain under carbon dioxide and nitrogen. They report that the rate of acid formation is substantially and regularly reduced in brain experimentally infected intracerebrally with the Lansing strain of poliomyelitis virus. In agreement with the results of Brodie and Wortis,¹ they found no difference in the rate of respiration (oxygen uptake) with minced tissue. Kabat et al.¹² have determined the lactic acid content of the brain of normal mice and mice infected with the Lansing virus. The mice were frozen in dry ice and the brains were then removed for lactic acid determination. The mean value for fifteen determinations on normal mouse brains was 20.7 and for infected brain 16.0 mg. per cent of lactic acid. Kabat¹³ has measured the concentration of phosphate esters in the brain of infected and non-infected mice. The esters are intermediate compounds in the carbohydrate metabolism. The following changes were reported: adenosine triphosphate was increased and the phosphocreatine and residual organic phosphate were decreased in the infected brain. These findings were offered in support of the assertion that the virus may act by interfering with "certain metabolic activities of the nerve cell."

Since the breakdown of glucose is a primary source of energy to the nerve cell, the fundamental implications of such observations, if capable of corroboration, are obvious. An investigation¹⁴ was therefore undertaken to determine the reproducibility of these experimental findings and some of the factors responsible for the results.

Adequate precautions were taken to control experimental factors which might lead to systematic error in the results. The experimental animals were littermates selected on a weight as well as an age basis. In this way the complicating effects not only of age but of initial nutritional state were limited. When paralyzed animals were sacrificed, an equal number of normal animals from the control group was sacrificed at the same time. On successive experiments, the order of infected and normal brain was shifted so that no Warburg vessel would always contain tissue from only one group. The glycolytic rates as measured are small, and there are day-to-day variations in activity of the brain as determined on the Warburg respirometer. Therefore these precautions and others are necessary if reliable and unbiased results are to be obtained.

The results obtained will be presented in detail elsewhere and are summarized in Table 1.

TABLE 1
Anaerobic Glycolysis in Normal and Poliomyelitis-Infected Mouse Brain

	ABC MICE		SWISS MICE	
	Normal	Infected	Normal	Infected
CO ₂ , 1st hr.	89	90	103	103
CO ₂ , 2nd hr.	73	73	71	72
No. of Mice	38	37	26	26
Experimental error, %	2	1	3	3

CO₂ values are expressed in μ l. per 100 mg. of wet brain tissue.

Two different strains of mice and two different procedures were used in obtaining these results. With the Swiss mice an exact duplication of the procedure used by Racker and Kabat was attempted.

Animals in all stages of illness were tested; some showed the first symptoms of the disease; others actually died as they were about to be sacrificed, and were carried on through the experiment. Even in these latter cases there was no marked decrease in anaerobic glycolysis.

It is apparent that the results reported by Racker and Kabat are in no way confirmed. No explanation is at present available to account for Racker and Kabat's results. Nevertheless, it is now evident that there is nothing fundamentally characteristic of the disease of poliomyelitis which is associated with anaerobic glycolysis and that can be demonstrated by the method used.

The speculation that the virus of poliomyelitis has its effect on some enzyme system of the tissues of the central nervous system is not questioned. It is in fact a good theory on which to base biochemical experiments. It must be concluded, however, that there is not adequate experimental evidence for such a theory at the present time. The changes observed by Kabat et al. in the lactic acid and phosphate ester content of the brain are not necessarily indicators of change in enzyme concentration, but may simply reflect among other things the nutritional state of the animal. Mice with poliomyelitis lose weight rapidly and do not feed as much as the normal mice.

COMMENTS ON METHODS

There are a number of practical problems which from the standpoint of methodology should be considered in the study of the biochemistry of poliomyelitis. Poliomyelitis is considered primarily to be a disease of the central nervous system and particularly of the anterior horn cells of the spinal cord. The virus is apparently fairly specific in its action, often skipping nerve cells in the cervical and thoracic region of the cord, attacking the lumbar region and only a few spots in the brain, even when the inoculation is intracerebral. A large part of the cells in an homogenate of the whole brain may be undamaged by the virus as judged from histological evidence. Furthermore, there is no assurance that there is actually one hundred percent destruction of the enzyme in the infected cell. The question arises, therefore, whether the methods are sensitive enough to detect such small differences. In order to have reasonable confidence that a reliable comparison is being made between infected and normal cells, it becomes necessary to have some method of determining the concentration of infected cells and of obtaining a high concentration of such cells. In poliomyelitis it would seem desirable to select the lumbar

region of the cord, use ultra-micro methods of analysis¹⁵ and determine the extent of infection by histological preparations from adjacent areas of the cord.

The problem of measurement of the enzyme concentration of a tissue is often difficult, and due consideration must be given to its limitations. For example, under the conditions used by Racker and Kabat, and by Wood et al. in checking their results, the $Q_{CO_2}^{N_2}$ (mm³ of CO₂ per mg. of dry tissue per hour) is found to be approximately 5, using a glucose substrate. Geiger¹⁶ has shown that an extract can be made from brain which on an equivalent basis gives a $Q_{CO_2}^{N_2}$ equal to 50. The implication is that only one-tenth the maximal enzyme activity of the cell is measured in brain mince or brei. Thus a determination made by this method would not necessarily indicate a change in the capacity of the glycolytic activity of the brain, but perhaps a change in the proportion of the total glycolytic activity which is determined in infected brain as compared to normal brain. It is apparent from the above considerations that no real decision has yet been reached as to the effect of the virus of poliomyelitis on glycolysis of nerve cells.

The question of applicability of results obtained by *in vitro* studies to an understanding of the cell *in vivo* is of course complicated and often uncertain. This complication is even greater when cell extracts are used rather than whole cells or tissue slices. Each method has its advantages as well as disadvantages, and information from each may, with proper limitations, be used to weave a composite picture of what happens in the cell in the living organism.

Effects which are specifically produced by the virus will be difficult to distinguish from those arising from generalized disturbances as a result of the disease. The nutritional state of the animal may have much to do with the biochemistry of its tissues.

SUMMARY

A few examples are cited to illustrate possible reactions which might be thrown out of balance by interference of a virus and thus upset cellular metabolism. The reported interference of poliomyelitis with the anaerobic glycolysis of the brain has not been confirmed. The methods are considered inadequate for such a demonstration. Comments on biochemical methods in poliomyelitis are included.

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The Effect of Muscle Pain on the Central Nervous System at the Spinal and Cortical Levels*

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PHYSIOLOGICAL studies have shown that movements involving various levels of the central nervous system are modified by and dependent on afferent impulses. Sherrington¹ found that the extensor reflex elicited by stimulation of a contralateral nerve developed its tension more slowly when the proprioceptive fibers of the extensor muscle were intact. In agreement with this observation was the fact that the electromyogram showed potentials of greater frequency and amplitude in the deafferented than in the normal muscle (Creed, et al.²). Apparently these proprioceptive fibers were stimulated during contraction and inhibited spinal motor centers.

Proprioceptive impulses have, in addition, a decisive influence on the distribution of the impulses to various

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motor neurons in the spinal cord. Contrary to the frequently made assumption that reflexes proceed in a stereotyped manner, Magnus³ observed that the reflex effect was determined not only by the afferent nerve fibers which were stimulated, but also by the posture of the limb in which the reflex movement appeared. Since deafferentation eliminates the specific influence of various postures on the reflex it is proven by these experiments that afferent impulses exert a selective influence on the motor reflex pattern.

Although less extensively studied, the effect of cortical stimulation is likewise altered by afferent impulses. Uch-tomsky⁴ reported an experiment showing that visceral afferent impulses modified cortically induced movements of somatic muscles. Mettler and Mettler⁵ found that phasic movements could no longer be obtained on cortical stimulation after deafferentation of the muscles involved. Still more marked were the effects of deaffer-

entation on voluntary movements. Mott and Sherrington⁶ observed that a deafferented arm was no longer used by the monkey although extensive movements resulted from cortical stimulation.

It may be concluded from these experiments that afferent impulses, particularly those originating in the muscles have a profound influence on the reflex activity of the spinal cord as well as on cortically induced movements. The fact that deafferentation may make voluntary innervation impossible although the deafferented limb participates in spinal reflexes suggests that afferent impulses are of particular importance for the physiological function of the cortex.

Although it is probable that the performance of movements induced reflexly or voluntarily is influenced not only by proprioceptive but also by exteroceptive and interoceptive (visceral) impulses, no systematic investigations have been made on this problem. That pain may play an important role is suggested by a chance observation of Hess,⁷ who found that the muscles of a fractured leg of a dog did not participate in shivering movements.

The purpose of the present paper is to report investigations on the influence of muscle pain on muscular coordination. In the human the method of Lewis⁸ of ischemic pain was applied. The blood supply to the arm was cut off through a blood pressure cuff by raising the pressure above the systolic pressure. Then muscular contractions were performed with the ischemic muscles until severe pain occurred which made further movements impossible. The pain which seems to originate in the muscles which had been contracted in ischemia is rather diffuse but tenderness is restricted to the formerly contracted muscle. Restoration of the circulation abolishes the pain almost instantaneously.

In one group of experiments pain and tenderness was elicited by this method in the muscles of the fingers and hand by flexing and extending them in ischemia until the "end point" was reached. Writing with closed eyes was used as a test and was performed under control conditions, during ischemia, and after ischemic pain had been produced. Figure 1 shows that ischemia, as such, does not influence handwriting. However, ischemic pain leads to a very marked lack of coordination which is only partially restored by optical control when the experimental subject is permitted to open the eyes during the writing tests. Other tests such as the finger-finger and finger-nose test showed likewise disturbances in coordination although to a lesser extent. The reason is probably the fact that in these movements the painful muscles are only partially involved and the disturbance in coordination of movements is particularly marked in the painful muscles.

A second group of experiments concerned the effect of ischemic pain on tendon reflexes. A group of experimental subjects showing vivid triceps reflexes was selected. It was observed that ischemia did not alter markedly the triceps reflex. If, however, muscle pain was evoked in the triceps by repeated extension of the elbow in ischemia, the triceps reflex disappeared. After restoration of the circulation the reflex gradually reappeared, but not infrequently it took more than one minute until the reflex had reacquired its full intensity. This inhibition of a tendon reflex was apparently restricted to the painful muscle. If the elbow was flexed repeatedly in ischemia the pain in the biceps had no influence on the triceps reflex. The experiments suggest that muscle pain may result in inhibition of those spinal motor neurons which innervate the "painful" muscle.

The two groups of experiments described thus far show that muscle pain alters spinal reflexes as well as

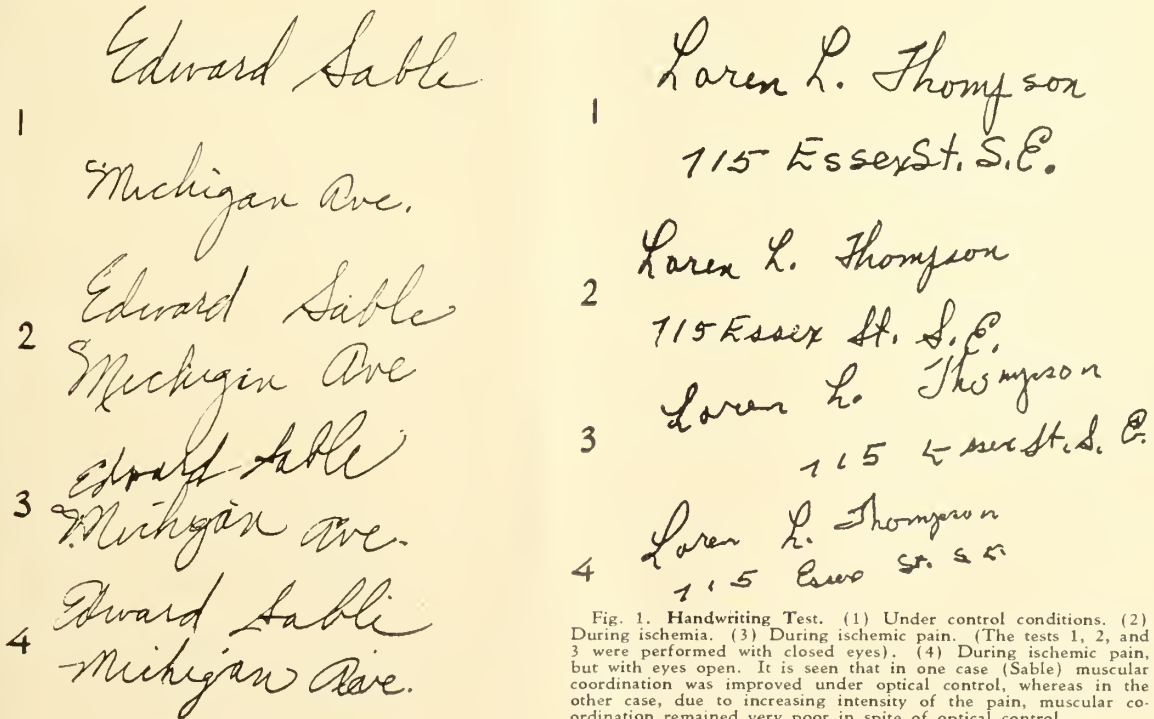


Fig. 1. Handwriting Test. (1) Under control conditions. (2) During ischemia. (3) During ischemic pain. (The tests 1, 2, and 3 were performed with closed eyes). (4) During ischemic pain, but with eyes open. It is seen that in one case (Sable) muscular coordination was improved under optical control, whereas in the other case, due to increasing intensity of the pain, muscular coordination remained very poor in spite of optical control.

voluntarily induced movements.⁹ They seem to indicate that the excitability of the central nervous system is altered at both spinal and cortical levels under the influence of muscle pain. The following experiments substantiate this conclusion.

The influence of muscle pain on the spinal cord was studied in cats by means of the knee jerk.¹⁰ This reflex was elicited mechanically at intervals of 2 seconds. The apparatus used was similar in principle to that described by Johnson.¹¹ In order to induce muscle pain hypertonic solutions of NaCl were injected into a muscle since Lewis had shown previously that the injection of 6 per cent NaCl into striated muscles elicits in man diffuse muscle pain similar to that produced by ischemic contractions. Since 6 per cent NaCl was ineffective in the narcotized cat a higher concentration (15 per cent) was used.

In order to correlate the effects produced by the injection of hypertonic NaCl solution on the spinal cord with the phenomenon of muscle pain it was necessary to find a reliable indicator for the presence of pain. In earlier investigations Ury and Gellhorn¹² had shown that the pupillary dilatation in the cat based on a diminution of the tone of the third nerve is a fine indicator of pain elicited by the electrical stimulation of the peripheral nerves (sciatic). This reaction is likewise elicited by the injection of hypertonic NaCl into the muscle and it is occasionally associated with vocalization. Only if pupillary dilatation with or without vocalization was distinct, was it assumed that pain had been elicited. It is interesting to note that if, due to a too great depth of narcosis the injection of hypertonic solution had no distinct effects on the pupils, no changes in the knee jerk were observed. If, however, muscle pain was associated with pupillary dilatation (and possibly vocalization) it caused a distinct change in the knee jerk. The effects observed followed the rule established by Sherrington for the electrical stimulation of nerve fibers since the injection of hypertonic NaCl solution into ipsilateral muscles was accompanied by a decrease in the knee jerk whereas contralateral stimulation of pain fibers with NaCl caused an increase in the knee jerk. There is only one difference between the effects of electrical stimulation of nerves with faradic currents and the excitation of nerve fibers by chemical stimulation induced by injection of hypertonic NaCl solution. Although electrical stimulation may even completely suppress the activity of the knee jerk during the stimulation, the effect disappears almost immediately after the cessation of the stimulation. If, however, pain fibers in the muscles are excited by hypertonic salt solutions the action is much more prolonged; this is obviously due to the fact that the restoration of the osmotic equilibrium in the muscle takes a longer period of time.

TABLE 1

Effect of Muscle Pain on Cortically Induced Movements	
I.	Intensification of cortically induced movements.
	a. stronger contractions.
	b. shorter "latent" period.
	c. longer after-discharge.
II.	Cortical spread as the result of pain.
	a. affecting adjacent cortical areas.
	b. causing the appearance of ipsilateral movements.
III.	Modification of cortically induced movements.
	a. substitution (extension instead of flexion).
	b. abnormal movement precedes weakened normal movement.

Legend to Figure 1

The experiments reported above on human spinal reflexes showed that muscle pain had an effect only on the proprioceptive reflex of the painful muscle and did not extend to other muscles. It is very likely that the difference between the animal experiments and the observations on humans is solely due to the intensity of the pain used. Hoffmann¹³ mentions that he was unable to influence the knee jerk by contralateral faradic stimulation of nerve fibers in man although such an effect is easily demonstrated in the cat.

The effects of muscle pain on the motor cortex were studied in a second group of experiments.⁹ The work was performed on anesthetized cats in which the motor cortex was stimulated by unipolar or bipolar electrodes which were held rigidly in the Horsley-Clarke apparatus. Since the cortex was stimulated with condenser discharges of various frequencies for 15 seconds some movements appeared immediately, others after various intervals of time, due to processes of facilitation. When the stimulation was carried out in intervals of 2 minutes its effect was practically constant in spite of frequent repetitions. Therefore, this procedure appeared to be a suitable basis for studying the effect of muscle pain on the motor cortex.

It was mentioned earlier with respect to the effects of pain on the knee jerk of the anesthetized cat that effects on this reflex were obtained only when distinct signs of pain such as pupillary dilatation and vocalization were present. This statement applies likewise to the present experiments.

In order to elicit pain hypertonic NaCl was injected or a muscle was stimulated with faradic currents. If pain was induced by means of the hypertonic NaCl injection the effect was more prolonged than when faradic stimulation was used; otherwise the results were similar. Table 1 gives a survey of the results obtained.

After a constant response following cortical stimulation of a certain motor point had been obtained, NaCl was injected into a muscle actually not involved in the movement elicited by cortical stimulation. If, for instance, stimulation of a point of the left motor cortex had called forth a flexion of the right shoulder 15 per cent NaCl was injected into various muscles of the right hind leg. Under the influence of these injections and accompanied by the reflex signs of pain formerly described, the cortically induced movements were greatly intensified. This intensification appeared in the form of stronger contractions as well as earlier appearance of the movements. In some instances it was observed that after cessation of the stimulation an after-discharge appeared which was not seen under control conditions. In other experiments in which a stimulation had been chosen which resulted in some after-discharge prior to the application of the pain stimulation it was found that muscle pain intensified and prolonged the after-discharge.

The intensification of cortically induced movements was frequently associated with a cortical spread. Returning again to the example cited above in which under control conditions a cortical stimulus elicited a contralateral flexion of the shoulder, it was seen that under the influence of pain the movement was extended to other parts

of the same extremity or to other limbs as well. How profoundly the cortex is altered in its excitability is clearly seen by the fact that under the influence of pain even ipsilateral movements may appear which were never seen when the same stimulus had been applied prior to the injection of NaCl. These effects of pain on the cortex were reversible within a few minutes and a surprising parallelism between the pupillary reactions and the effects on the cortex was observed. Almost exactly at the same time at which the pupil had returned to its original width, the effects of pain on the cortex had disappeared.

The most striking result of muscle pain on cortically induced movements was the observation that under the influence of these afferent impulses cortical stimulation resulted in movements which were not only quantitatively but also qualitatively different from those seen in the preceding and following control periods. If, for instance, stimulation of the left motor cortex had caused the appearance of flexion of the right hip under control conditions it was seen that muscle pain changed the effect of cortical stimulation so that extension of the hip was substituted for flexion. This effect again appeared at a time when the action of pain as judged by the pupillary reaction and vocalization was greatest. As the pain phenomena gradually subsided the extensor movement became weaker, later it was followed by a flexor movement and finally the flexor movement appeared in its original strength without having been preceded by an extension.

The experiments show that reflex movements as well as the effects of stimulation of the motor area are pro-

foundly altered under the influence of stimuli which cause, in the human, muscle pain and elicit, in the animal reflex phenomena such as pupillary dilatation and vocalization which are commonly associated with pain in animals. The conclusion seems therefore to be justified that movements are modified in intensity and quality, not only by proprioceptive impulses, but also by muscle pain. It is not assumed that the effect of pain is specific for the pain fibers originating in the muscle because in some experiments it was seen that electrical stimulation of a cutaneous nerve (saphenous) likewise resulted in alteration of the knee jerk as well as in changes in the effects of stimulation of the motor cortex. The effects of muscle pain were solely emphasized in view of the fact that muscle pain and tenderness are present in poliomyelitis according to several authors and may therefore play a significant part in the neuro-muscular disturbances seen in this disease.

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Book Reviews

The Evolution of Tuberculosis: As Observed During Twenty Years at Lymanhurst. Minneapolis Board of Public Welfare. Paper bound. 255 pages, 10 illustrations and 62 tables. Minneapolis, Minn.: THE JOURNAL-LANCET, 1944. Copies may be obtained from Minnesota Public Health Association, 11 West Summit Ave., St. Paul, Minn. Price \$2.50.

Of the four parts into which the book is divided, the first one is devoted to organization and activities. The Lymanhurst plan originally was organized in two sections, a hospital and a day school. The school provided, besides instruction, special food and rest periods. Experience soon made possible abandonment of the hospital. An out-patient clinic for children formed part of the medical program, and this (through 85,019 visits to 19,045 patients) became the principal source of this profound 20-year study of the life-cycle of tuberculosis. In this section, too, are described Doctor Harrington's and the author's visionary objectives in the project, the medical and nursing staffs, and the diverse responsibilities and activities of all those who had part in the study and undertaking.

Part two is a concise, pleasingly written and enjoyable clinical dissertation covering the clinical aspects of pulmonary tuberculosis. First are detailed some of the earlier views and pathological findings. Then, with great care to detail, the evolution of tubercles is interestingly described with all the attendant blood, cellular, tissue and chemical changes. Here, too, are minutely discussed the questions of allergy and resistance and the basic considerations, which, the study has shown, make the Mantoux test and the sensitivity of the tissues induced by the first invasion of the tubercle bacilli so important in diagnosis and the future course of the disease. Diagnosis, treatment, prog-

nosis and prevention of not only first infection but of the adult type of tuberculosis are presented in a fascinating manner. And finally in this section, the epidemiology and case-finding of tuberculosis receive adequate attention, not only from basic and fundamental approaches, but in a practical applicable manner. This section could be used as a primer or compendium of clinical tuberculosis. Not only does it answer all the questions regarding allergy, resistance and the tuberculin test, but it intrigues the curiosity and interest of anyone concerned with any aspect of the fight against tuberculosis.

For those who advocate case reading in the study of medicine, the third section of this volume incorporates a wealth of material seldom seen in one book. The twenty-year observation period is divided into four 5-year stages. During the first 5-year period 3,748 cases of first infection tuberculosis were observed and analyzed. In the second period 5,122 children were observed, in the third 5,179, and during the fourth 4,970 such cases were observed and followed. One of the clinically important features of such a study is the inclusion in this section of studies of 11,347 tuberculous persons in the adult clinic. Thus, having discussed first infection tuberculosis, its evolution and relationship to adult tuberculosis is portrayed clinically through experiences with the disease in this adult clinic.

The fourth and final section of the book summarizes the findings and observations of 18,856 children and 11,347 adults and then very compactly and succinctly presents the author's conclusions. The book is remarkable in that each case is accounted for, that not only the first infection but adult forms of the disease are described and analyzed, that acute, fulminant tuberculosis and the chronic types are represented, and that the relationships of each are exemplified with many cases and abundant observations. And conclusions are expressed in forthright terms, leaving a clear-cut and lasting impression upon the reader.

For anyone interested in any phase of tuberculosis, this book will prove a gold-mine of information, an inspiring account of the possibilities of constructive work and planning, a stimulus to greater clinical curiosity and acumen, and a concise textbook.

Pain Mechanism, a Physiologic Interpretation of Causalgia and Its Related States, by W. K. LIVINGSTON, M.D., Lt. Comm. U.S.N.R.; New York: Macmillan Co., 254 pages; (a monograph illustrated with line drawings); 1943. Price \$3.75.

The author, who in 1935 published a valuable book on the clinical aspects of visceral neurophysiology, deals in the present volume with a discussion of various forms of causalgia. However, the book is by no means a clinical discussion only. On the contrary, an effort is made to interpret the clinical data in the light of modern neurophysiological concepts and results. An interesting sidelight is thrown on fundamental questions such as the nature of protopathic and epicritic pain, the condition of hyperalgesia and the sensations in the phantom limb. The discussion culminates in the following tentative interpretation of the causalgic states:

"An organic lesion at the periphery, involving sensory nerve filaments, may become a source of chronic irritation. Afferent impulses from this 'trigger point' eventually create an abnormal

state of activity in the internuncial neuron centers of the spinal cord gray matter. The internuncial disturbance in turn is reflected in an abnormal motor response from both the lateral and anterior horn neurons of one or more segments of the cord. The muscle spasm, vasomotor changes, and other effects which this central perturbation of function brings about in the peripheral tissues, may furnish new sources for pain and new reflexes. A vicious circle of activity is created. If the trigger point is removed early, the process may subside spontaneously. If the process is permitted to continue, it spreads to involve new areas, and tends to acquire a momentum that is increasingly difficult to displace. Perhaps in this stage, even a removal of the original irritant may not be sufficient to establish a cure. But if an important part of the circle of reflexes can be interrupted, the process may subside, and a normal physiologic status is again established. If again the pathologic patterns gain the ascendancy, the repeated breaking of the circle may result in a permanent cure."

The book is written in a lucid and interesting style. The clinician as well as the physiologist will read it with much profit.

LIST OF PHYSICIANS LICENSED BY THE MINNESOTA STATE BOARD OF MEDICAL EXAMINERS MAY 12, 1944

EXAMINATION HELD APRIL 18, 19, 20, 1944

Name	School	Address
Balfour, Donald Church, Jr.	Northwestern U., M.B. 1942, M.D. 1943	Mayo Clinic, Rochester, Minn.
Barr, Maxwell Michael	U. of Minn., M.B. 1943	University Hospital, Minneapolis, Minn.
Becker, Sidney Forbes	U. of Minn., M.B. 1943	25 Sidney Place, S.E., Minneapolis, Minn.
Bosma, James F.	U. of Mich., M.D. 1941	500 Harvard St., S.E., Minneapolis, Minn.
Brooksby, Wilford Armond	Northwestern U., M.B. 1942, M.D. 1943	Mayo Clinic, Rochester, Minn.
Carr, David Turner	Med. Col. of Va., M.D. 1937	Mayo Clinic, Rochester, Minn.
Correa, Dale Homer	U. of Mich., M.D. 1942	Mayo Clinic, Rochester, Minn.
Cox, William Foscue	Med. Col. of Va., M.D. 1942	Mayo Clinic, Rochester, Minn.
Evert, John Andrew	Harvard U., M.D. 1942	Mayo Clinic, Rochester, Minn.
Ewing, John Deeny	U. of Minn., M.B. 1943	817 Cleveland Ave. S., St. Paul, Minn.
Flasher, Jack	U. of Minn., M.B. 1943, M.D. 1943	Mayo Clinic, Rochester, Minn.
Flashman, Forrest Llewellyn	Northwestern U., M.B. 1941, M.D. 1942	Mayo Clinic, Rochester, Minn.
Folsom, Louis Bartlett	U. of Minn., M.B. 1943	Northwestern Hospital, Minneapolis, Minn.
Freeman, John George	U. of Minn., M.B. 1943	Miller Hospital, St. Paul, Minn.
Gordon, Norvan Floyd	U. of Wis., M.D. 1943	Mayo Clinic, Rochester, Minn.
Hinchey, John James	Baylor U., M.D. 1940	Mayo Clinic, Rochester, Minn.
Holmes, Chester Leon	U. of Tenn., M.D. 1942	Mayo Clinic, Rochester, Minn.
Jackson, Hunter Sheppard	Med. Col. of Va., M.D. 1942	Mayo Clinic, Rochester, Minn.
Johnson, Frank Edward	U. of Minn., M.D. 1943	1516 N. Broadway, New Ulm, Minn.
Kadish, Arnold Henry	Wayne U., M.D. 1943	Mayo Clinic, Rochester, Minn.
Kirschbaum, Arthur	U. of Minn., M.B. 1943, M.D. 1943	318 Harvard St. S.E., Minneapolis, Minn.
Kurzweg, Frank Turner	Harvard U., M.D. 1942	Mayo Clinic, Rochester, Minn.
Levy, Marvin Shephard	U. of Pa., M.D. 1940	Mayo Clinic, Rochester, Minn.
Long, Mary	U. of Louisville, M.D. 1943	Mayo Clinic, Rochester, Minn.
Margulies, Harold	U. of Tenn., M.D. 1942	Mayo Clinic, Rochester, Minn.
Mixer, Harry W.	U. of Minn., M.B. 1943	University Hospital, Minneapolis, Minn.
Nielsen, Wendell Lorenzo	U. of Pa., M.D. 1942	Mayo Clinic, Rochester, Minn.
Nord, J. Erling	Temple U., M.D. 1943	210 Gramercy Ave., Minneapolis, Minn.
Perkins, Roy Frank	U. of Ill., M.D. 1941	Mayo Clinic, Rochester, Minn.
Rentiers, Paul Louis	U. of Alberta, M.D. 1942	Mayo Clinic, Rochester, Minn.
Semsch, Robert Daniel	U. of Minn., M.B. 1943	1917 Colfax Ave. S., Minneapolis, Minn.
Strakosch, Ernest Anthony	U. of Minn., M.D. 1942	2449 S. Dearborn, Chicago, Ill.
Suter, Stanley Charles	Jefferson, M.D. 1936	Mayo Clinic, Rochester, Minn.
Swain, Jean Margaret	U. of Minn., M.B. 1943	University Hospital, Minneapolis, Minn.
Triolo, John Victor	Long Island Col. of Med., M.D. 1941	Mayo Clinic, Rochester, Minn.
Webb, Margaret Alexander	U. of Texas, M.D. 1942	Mayo Clinic, Rochester, Minn.
White, Ellison Fred, Jr.	U. of Tenn., M.D. 1942	Mayo Clinic, Rochester, Minn.
Wilson, James McCrory	U. of Colo., M.D. 1943	Mayo Clinic, Rochester, Minn.

BY RECIPROCIDITY

Bauer, Eugene Leo	U. of Illinois, M.D. 1942	1359 N. Hamline Ave., St. Paul 4, Minn.
Smith, Norvin Richard	U. of Nebraska, M.D. 1935	1009 Nicollet Ave., Minneapolis, Minn.

BY NATIONAL BOARD CREDENTIALS

Briggs, Natalie Maria	Long Island Col. of Med., M.D. 1940	Mayo Clinic, Rochester, Minn.
Giffin, Mary Elizabeth	Johns Hopkins U., M.D. 1943	Mayo Clinic, Rochester, Minn.
Haunz, Edgar Alfred	U. of Buffalo, M.D. 1943	Mayo Clinic, Rochester, Minn.
Kirklin, Margaret Katherine	U. of Buffalo, M.D. 1942	Mayo Clinic, Rochester, Minn.
Kolouch, Fred, Jr.	U. of Minn., M.B. 1940, M.D. 1941	817 Essex St. S.E., Minneapolis, Minn.
Varney, James Howard	U. of Oregon, M.D. 1942	Mayo Clinic, Rochester, Minn.

News-Letter

of the American Student Health Association

RUBY L. CUNNINGHAM

1880 - 1944

Dr. Ruby L. Cunningham of Berkeley, Calif., who for many years served as senior women's physician at the Cowell Memorial Hospital, and as Associate Professor Hygiene at the University of California at Berkeley, passed away on June 25th after an illness of several months. She was born in Riverside County, California, and after graduating from San Bernardino High School came to Berkeley to attend the University of California, where she was awarded the B.S. degree in 1903. She taught science in several California high schools and later returned to the University where she received her M.S. in 1912 and an M.D. degree in 1914, serving her internships at the San Francisco Hospital.

Before joining the Health Service Staff of the U. C. in 1918, she was engaged in private practice in Berkeley. She succeeded Dr. Romilda Paroni, and became assistant and later associate professor of hygiene and senior physician for women. For over a quarter of a century she devoted full time in administering to the health of women students at the University of California and to the teaching of hygiene. Her kindly spirit will be remembered by thousands of university women whom she served, and as a true physician and teacher.

Dr. Cunningham was a member of the Alameda County Medical Society, the California Medical Association and the American Medical Association. She was also a member of the American Student Health Association, serving at one time as vice-president and member of the Council. She was past president of the Pacific Coast Section of the American Student Health Association and a member of the Board of Editors of *JOURNAL-LANCET* at the time of her death, and one time president of the Berkeley Health Center. She held a membership in the Sigma Xi and Delta Omega national honor societies. She took an active interest in women's campus activities, was a charter member of the Women's Faculty Club, a member of the Prytanean Society and Mortar Board. She made many scientific contributions to medical science and published several papers on students' health problems.

Dr. Cunningham had lived with her sister, Mrs. Mathew C. Lynch, at 1830 Yosemite Road, Berkeley, Calif., for several years prior to her death. Her untimely passing is greatly regretted by all with whom she was associated.

ROBERT T. LEGGE, M.D.,
Berkeley, Calif.

ASHA DIGEST OF MEDICAL NEWS

Canker Sores. With many patients the occurrence of small ulcers on the tongue or mouth is a common experience. The precipitating causes appear to be varied; licking stamps or envelopes, sucking hard candy, eating dried fruit, eating an excess of sweets, have all been related at times to the development of these ulcerations. The folk remedy for many years has been touching the ulcer with alum.

George R. Warner (*Oral Hygiene*, Dec. 1943) recommends for the treatment of these ulcers a saturated solution of trichloroacetic acid applied topically. The area should be dry so that the escharotic action of the acid will be limited to the ulcerated area. Two or three applications may be necessary. The author suggests that where canker sores are multiple or recurrent food allergy tests should be made.

Sodium Propionate for Epidermophytosis. Keeney and Broyles (*Bull. Johns Hopkins Hospital*, Dec. 1943) report the successful use of sodium propionate in the treatment of "athlete's foot" and tinea cruris. The drug was used topically as a 10 per cent ointment or powder or a 20 per cent aqueous solution. Treatment for 12 weeks cured 91 per cent of 23 patients with tinea cruris (9 per

cent continuing to show a trace of the infection). Treatment for 20 weeks cured all but 1 of 55 cases of "athlete's foot"; in the one case cultures continued positive. Toxic symptoms were absent except that one out of 90 patients developed a contact dermatitis.

Zephiran for Surgical Cleansing of Hands. Shumacker and Bethea (*Surgery*, December 1943) report that a brief scrubbing of the hands and forearms in 1:1000 aqueous Zephiran, followed by a three minute soaking in the same solution, produced as satisfactory results as did more prolonged scrubbing. Though soap exerts an inactivating action on Zephiran the following points in favor of Zephiran are enumerated: it has a certain detergent, keratolytic and emollient action; it has a low surface tension; it is not irritating to the skin; it is compatible with local anesthetic agents and the sulfonamides; its germicidal efficiency is not affected by freezing, storage at temperatures above 50° C. for 18 days, or at room temperature for more than eight months.

Immunization in the U. S. Army. Lt. Col. Arthur P. Long in the January 1944 issue of the *Amer. Jour. of Public Health* stated as follows regarding immunization in the U. S. Army:

(1) As the result of routine immunization there have been very few cases of smallpox and typhoid fever.

(2) Tetanus has occurred in only 9 persons and only 2 of these had completed the initial series of toxoid injections required by Army regulations.

(3) Immunization is required only for persons specially exposed in the case of yellow fever, typhus, cholera or plague.

(4) The occurrence of jaundice following yellow fever immunization appears to have ceased after omission of human serum from the vaccine.

(5) Diphtheria toxoid, scarlet fever streptococcus toxin, and gas gangrene antitoxin are used only under special circumstances.

(6) Human immune serum and human globulin are used only in patients who must avoid all infections and yet have been exposed to measles or mumps.

(7) The usefulness of influenza vaccine, gas gangrene toxoid, and dysentery vaccine are being studied.

New Symbols for War Gases. The Chemical Warfare Service of the Office of Civilian Defense, Washington, D. C., recently assigned new symbols to certain chemical warfare agents and instituted symbols for certain gases which previously had no designation. The list follows:

<i>Chemical Warfare Agents</i>	<i>Symbols</i>	
	<i>Old</i>	<i>New</i>
Lewisite.....	M-I	L
Mustard.....	HS	H
Mustard-lewisite mixture.....	MS	HL
Brombenzylcyanimide.....	CA	BBC
Phenyldichlorarsine.....	PDA	PD
Arsine.....		SA
Cyanogenchloride.....		CC
Hydrogencyanide.....		AC
Nitrogen mustard.....		HN

New Diagnostic Tests for Typhus Fever. As early as 1910 Bass and Watkins described a rapid, bedside agglutination test for typhoid fever. The test involved simply mixing a suspension of typhoid bacilli with a drop of hemolysed blood on a glass slide.

Application of this same principle to the diagnosis of typhus fever is now reported by Eyer and Brix (*Dent. Militärarzt* of April 1943). Instead of a glass slide the authors use a strip of "structureless paper," on one end of which a drop of Protens OX19 suspension (stained with methylene blue) is dried. In making the test a drop of tap water is added to the spot of dried bacillary suspension, and resuspension is attained by stirring with a glass rod; to the suspension is added a small drop of finger blood from the suspected patient. The strip is tilted to and fro as in making a blood-grouping test. The reaction may be read with the naked eye or under a low power lens and it is still readable after the drop has dried. The strip can therefore be kept as a part of the record. A strongly positive reaction is shown by the prompt formation of small blue clumps (tending to congregate at the periphery of the drop) and by a change in the color of the fluid from greyish-red to almost pure red. Weak positives show smaller clumps formed less rapidly and the fluid becomes only reddish, not pure red. In negatives, no change is seen.

For the differentiation between epidemic and endemic typhus Plotz, Wertman and Bennett ("The Serological

Pattern in Epidemic Typhus Fever, Div. of Virus and Rickettsial Diseases, Army Medical School") announce a new complement-fixing technic. Specific purified epidemic and murine rickettsial complement-fixing antigens are prepared from infected yolk sacs. In a study of 32 cases of epidemic typhus these workers report:

(1) All 32 gave a positive complement-fixation test, with a rise in titer when using an epidemic antigen.

(2) 56 per cent of the 32 cases were positive by the tenth day, 78 per cent by the twelfth day, and 100 per cent by the sixteenth day of illness.

(3) Most of the cases gave fixation with an epidemic antigen and no fixation with a murine antigen.

(4) Where cross-fixation did occur fixation with the homologous antigen was always higher than with the murine antigen.

(5) Persistence of complement-fixing antibodies for many months after the onset of the disease was the rule.

Streptococcal Infections of the Respiratory Tract. Recent experience in U. S. military camps and stations confirms the following points with regard to streptococcal infections of the respiratory tract.

1. Streptococcal pharyngitis and tonsillitis cases are even more apt to be complicated by acute rheumatic fever than are scarlet fever cases.

2. Since streptococcal pharyngitis and tonsillitis are more dangerous than scarlet fever and are just as communicable, isolation of cases of streptococcal pharyngitis and tonsillitis is just as important as is isolation of cases of scarlet fever.

3. Diagnosis and isolation of streptococcus pharyngitis and tonsillitis cases is only completely successful where provision is at least made for routine blood-agar plate cultures of every "sore throat with fever."

4. Painting of sore throats without taking cultures and temperatures contributes but little to the comfort and improvement of the patient and postpones or misses entirely the chance to establish an accurate diagnosis and to prevent spread of the infection to others.

5. Isolation of streptococcus pharyngitis and tonsillitis cases and of scarlet fever cases partially fails in its function of preventing spread of the infection unless such cases are held in isolation until all abnormal discharges cease.

6. The "type" of a Group A streptococcus is of much less importance than its ability to invade human tissues and produce disease there; and the two characteristics are often totally unrelated.

7. Reduction of the number of moisture-droplet-borne and dust-borne streptococci in the air of living spaces has proved in some places to be an important factor in controlling streptococcal infections of the respiratory tract.

8. The prophylactic use of sulfadiazine in the immediate contacts of cases of streptococcal pharyngitis, tonsillitis and scarlet fever has proved useful in reducing the number of secondary cases of these infections; it has not, however, been shown to succeed in ridding the throats of these contacts of B hemolytic streptococci.

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MINNEAPOLIS, MINNESOTA, JULY, 1944

THE PRESENT STATUS OF POLIOMYELITIS MANAGEMENT

There is no rule of thumb for the treatment of any disease. For some diseases there are more rigidly defined routines of treatment than for others, but infantile paralysis does not fall into the group for which the scientific rationale of treatment is so clear that deviations from a fixed rule are impossible.

Whenever medical research discovers a certain or virtually certain method of combatting a pathogenic agent or the effects of such an agent it is a part of the duty of every physician to employ that method unless and until other equally good or better methods are at hand. But until a method has been proved to have such superiority over all others and to be reasonably successful, it is not only the right but the duty of physicians to examine all methods critically and to continue to search for better ones.

Poliomyelitis is a virus disease of the central nervous system with serious effects upon the motor apparatus of

the body. No proof exists that any effects upon muscles and their actions come about in any way but secondarily to neurone damage. There have been suggestions from two lines of evidence that primary muscle damage occurs, but in neither case will the arguments bear rigorous scrutiny. Our present knowledge does not permit us to ascribe any of the pathological consequences of poliomyelitis to primary damage anywhere but in the nervous system.

Nevertheless because the obvious end effects of infantile paralysis are muscle function defects it is apparent that sound therapeutic practice should look toward preservation of motor functions as its goal. Viewed broadly the problems of treatment in poliomyelitis are twofold, first the limitation of damage in the acute phase to the lowest possible amount, and second the achievement and maintenance of maximal utilization of the motor units remaining after the virus has done its damage.

Unfortunately nothing is known with certainty as to how the damage in the early acute stage can be minim-

ized. Conservative management with measures directed toward symptomatic relief are indicated. To what extent any such measures decrease neuronal damage is quite unknown.

In the later period of the acute stage likewise, the advantages of one or another form of management are uncertain. The Kenny workers have accumulated clinical data showing that the energetic use of hot packs in this stage is not inferior as a method of treatment to any other technic, and doubtless superior to some, such as rigid immobilization. These workers stress the increased comfort of patients so treated and suggest a lower incidence of ultimate crippling paralyses. In the acute stage of the disease several workers have noted muscle tenderness, resistance to extension and abnormal degrees of resting tonus, among other signs, which Miss Kenny refers to collectively as muscle spasm. The role played by such defects in causing or influencing impairment of function is at present unknown although it has been suggested that they exert an unfavorable effect. Consequently the virtue of any measures directed at relieving such symptoms is still controversial.

Regarding the importance of conserving and then bringing into use every possible motor unit undamaged by the disease there can be no doubt whatever. After the virus disease has run its damaging acute course the job of the physician and his aides in poliomyelitis treatment is perfectly clear, in principle at least. That job is to assist the patient in learning how to utilize his undamaged motor units, to prevent disuse atrophy and to obviate crippling deformities. In most instances this problem is one of highly expert physical therapy. In this area there is no doubt that the Kenny method is effective. There are undoubtedly other regimens which have yielded equally successful outcomes, but there can be little question that Miss Kenny has given strong and useful accent to an altogether too frequently neglected aspect of poliomyelitis after-care.

There has been much controversy over the merits of the Kenny methods of treatment of infantile paralysis. That treatment definitely has not consistently prevented crippling paralysis in cases with permanent anterior horn cell damage. Whether it has resulted in a smaller fraction of such paralysis is impossible to say because no studies in which exactly comparable paired cases were treated by this and any other method have ever been made. Nevertheless, it has been conceded by many that crippling deformity is less in the series of Kenny-treated patients than in other comparable groups of cases. Further it is not unlikely that a larger share of undamaged motor units are brought into useful activity by the energetic re-training procedures in the Kenny regimen than have been so utilized in the types of treatment formerly in vogue. It is quite unnecessary to adopt Sister Kenny's terminology of "mental alienation" in order to concede that in her muscle re-education she accomplishes something useful, something which every physician treating paralytic poliomyelitis has also attempted to achieve and in which many have been less successful.

It is unfortunate that Sister Kenny has introduced two ill-defined terms with ambiguous meanings into the description of the functional pathology of poliomyelitis because this has led to unnecessary vituperation. Neither "spasm" nor "mental alienation" are words whose widely accepted meanings correspond with her usages. Nevertheless, it would be less than generous for medical scientists to ignore a contribution because it was described awkwardly. Rather it is to be hoped that more exact study will permit a satisfactory description of the several components in the damage to motor units in poliomyelitis, and that the positive merits in Miss Kenny's therapeutic procedures may be singled out for more effective use. Sister Kenny has unquestionably performed a great service in emphasizing that many factors are involved in re-learning the use of muscles with damage to large numbers of motor units, and that great practical advantage can be gained by physical therapy methods directed toward prevention of skeletal deformity. Whether her methods are unique or without precedent is of little practical consequence in this matter because it must be admitted that she has given an emphasis to those notions which they did not have before.

The pressing problem in poliomyelitis management is still fundamental research. The ideal solution of the problems of any disease is its prevention. Search should always be continued for such a solution until it is found. But in the absence of such an ideal solution, there are two "next best" approaches. The better of the two would be a method of preventing as completely as possible the deleterious effects of the pathogenic agent. The next best is the salvage of all that is left to work with after the agent has done its damage.

Research in the prevention of the disease has not as yet yielded an answer of any use. Research on combatting the pathogenic agent during the course of the disease has also been disappointing. Sera and chemotherapeutic agents have not as yet been found to be effective. Further study in both of these directions is going on apace and the optimism born of successes in other fields leads us to be very hopeful that a useful answer will be found. Research on the best methods of salvaging and strengthening what is left of the motor apparatus after the acute damage phase is past has yielded much that is of value. Such studies too are being prosecuted with great energy by investigators of high talent. It is not too much to hope that in this area as well there will be important progress in the near future.

J. C. MCKINLEY, M.D.
 IRVINE MCQUARRIE, M.D.
 W. A. O'BRIEN, M.D.
 M. B. VISSCHER, M.D.

NATIONAL FOUNDATION'S BULLETIN

The National Foundation for Infantile Paralysis has issued a bulletin containing valuable suggestions to residents of areas where poliomyelitis occurs. Copies may be obtained without charge from the National Foundation for Infantile Paralysis, Inc., 120 Broadway, New York 5, New York.

News Items

At the closing session of the 57th annual meeting of the North Dakota Medical association convention at Fargo, May 7, 8, 9, Dr. F. L. Wicks, Valley City, was elected president. The house of delegates also elected Dr. James F. Hanna, Fargo, president-elect; Dr. A. E. Spear, Dickinson, first vice president; Dr. P. G. Arzt, Jamestown, second vice president; Dr. L. W. Larson, Bismarck, secretary. Other officers: Dr. Jno. H. Moore, Grand Forks, speaker of house of delegates; Dr. W. W. Wood, Jamestown, treasurer; Dr. A. P. Nachtwey, Dickinson, delegate to A. M. A., 1944; Dr. W. A. Wright, Williston, alternate delegate; councilors, Dr. P. H. Burton, Fargo; Dr. C. J. Glaspel, Grafton; Dr. N. O. Ramstad, Bismarck; Dr. Jos. Sorkness, Jamestown, appointed to fill unexpired term of Dr. P. G. Arzt, resigned.

The Council elected Dr. R. N. C. Ramstad chairman and Dr. C. J. Glaspel secretary, and appointed as editorial committee for the JOURNAL-LANCET Drs. L. W. Larson, W. H. Long, G. W. Toomey, H. D. Benwell and O. J. Arnsen.

At the 26th annual meeting of the North Dakota Academy of Ophthalmology and Otolaryngology at Fargo, N. Dak., May 9, 1944, the following officers were elected: President, Dr. W. L. Diven, Bismarck; vice president, Dr. C. W. Robertson, Jamestown; secretary-treasurer, Dr. A. E. Spear, Dickinson. Papers were read before the Society by Dr. L. R. Boies of the University of Minnesota and Dr. M. P. Lampert of Minot, N. Dak.

The 63rd annual session of the South Dakota medical association was held May 21, 22, 23 at Huron. Among the important speakers were Dr. A. V. Stoesser and Dr. Frederic E. B. Foley of the faculty of the University of Minnesota school of medicine; Dr. John S. Lundy of the Mayo clinic; Dr. Virgil S. Counsellor of the Mayo foundation; Dr. William F. Braasch of the Mayo clinic, Rochester, Minn., and a member of the board of trustees of A. M. A.; Dr. Harry A. Oberhelman of Loyola university school of medicine; Dr. Paul H. Holinger of the University of Illinois college of medicine; Dr. C. C. Applewhite of Kansas City, Mo., director of District 7, U. S. Public Health Service; Dr. C. M. Wilhelmj of Omaha, dean of the school of medicine of Creighton university; Major George H. Stein, radiologist at the Sioux Falls army air field; Lt. Col. Saul Michalover, chief of medical service at the Sioux Falls army air field and Dr. H. E. Harvey of Lincoln, Neb.

Dr. D. S. Baughman of Madison is the new president. Other officers elected are Dr. Wm. Duncan, Webster, president-elect; Dr. F. W. Howe, Deadwood, vice president; Dr. R. G. Mayer, Aberdeen, re-elected secretary-treasurer; Dr. N. J. Nessa, Sioux Falls, delegate to A. M. A.; Dr. Baughman, alternate delegate. Councilors: Dr. J. L. Calene, Aberdeen; Dr. H. R. Brown, Water-

town; Dr. C. E. Robbins, Pierre; Dr. E. M. Stansbury, Vermillion.

The Auxiliary elected Mrs. D. S. Baughman, Madison, president; Mrs. G. S. Adams, Yankton, president-elect; Mrs. William Duncan, Webster, first vice president; Mrs. Robert Murdy, Aberdeen, second vice president; Mrs. J. R. Lloyd, Mitchell, recording secretary; Mrs. Myron K. Larsen, Watertown, corresponding secretary and treasurer.

Dr. Wicks, Valley City, North Dakota, has recently prepared an attractive little brochure to commemorate the 25th anniversary of the North Dakota academy of ophthalmology and oto-laryngology. Dr. Wicks deserves much credit for the many items of historical and social interest he has collected and preserved for the academy and for the attractive appearance of the booklet. It will be treasured by the members not only for its record of 25 eventful years, but as a perpetual reminder of the loyal services of Dr. Wicks during the many years in which as an officer of the academy he played so large a part in its success.

Twenty-seven grants totalling \$1,128,770 for intensifying and broadening the nation-wide fight against Infantile Paralysis, have just been made by the National Foundation. Three of these are long-term grants of which \$320,000 has been allocated to the medical school of the University of Minnesota. To Northwestern medical school goes \$175,000 for research in the field of physical medicine. Michigan School of Public Health receives \$325,000 for virus research and for the training of virologists. In Minnesota the proposed investigation will be assigned to a committee consisting of the heads of departments concerned. The chairman of this committee will be Dr. Maurice B. Visscher, participating guest-editor of this issue.

The Minneapolis Public Library will continue its art exhibit representing the work of leading American medical artists until July 22. Contributors are: Jean Hirsch, head of the Medical Art Shop, the University of Minnesota; Gladys McHugh, University of Chicago; Ralph Sweet, The Medical Center, University of California; Russell Drake of the Mayo Clinic; Daisy Stilwell, staff artist with Modern Medicine; Dr. Harry Wilmer, University of Minnesota; Dr. Frank Netter (twenty-four paintings have been loaned by the Ciba Pharmaceutical Products Co.); C. W. Shepard of Rush Medical School (paintings loaned by the Searle Company); Evelyn Erickson of Wayne University Medical School, Detroit, Michigan; and Elizabeth Brödel of the New York Hospital.

Miss Stilwell's pictures were also exhibited at the American Physicians Art Association exhibit at the American Medical Association meeting in Chicago in June, the only pictures by a layman that were hung. For this she was awarded a special prize of a silver cup and a certificate of merit. The pictures attracted a great deal of favorable attention. They have already been reproduced in *Collier's* and will appear in Mead Johnson & Company's house publication *Parergon*.

Dr. Jay Arthur Myers of Minneapolis was inducted into the office of president of the American College of Chest Physicians at the annual meeting of the College held at the Stevens Hotel, Sunday night, June 11.

Dr. Myers was elected as president-elect of the American College of Chest Physicians at Atlantic City, New Jersey, in June 1942. Because of the war the college did not meet in 1943, and all of the officials of the college were frozen in their respective offices. In accord with this ruling, the president of the college, who took office in June 1942 served for a period of two years. Dr. Myers, taking office as previously indicated on June 11, 1944, will serve for one year unless some unforeseen condition arises to prevent the holding of a meeting of the college in 1945.

Dr. Myers is one of the charter members of the American College of Chest Physicians and he has been active on a number of important councils and committees. He is chairman of the scientific program committee and arranged the program for this annual meeting in Chicago, June 10-12.

Dr. C. W. Schoregge of Bismarck, N. D., Dr. J. C. Gaspel of Grafton, and Dr. F. L. Wicks of Valley City have been named members of the state board of medical examiners by Governor John Moses.

The Hospital for Joint Diseases, 1919 Madison Ave., New York 35, a general hospital featuring orthopedic surgery, invites applications for house staff appointments to fill twelve places; four interns to begin October 1, 1944, eight to begin July 1, 1945, for nine months.

Resident physicians in the specialties of neuro-medicine, ophthalmology, pathology and pediatrics are being sought by the Los Angeles County Civil Service Commission for positions in the County General hospital. Applicants of ages twenty-one to fifty-five will be considered. Full information may be obtained from the office of the Commission, 102 Hall of Records, Los Angeles 12, California.

A refresher course in obstetrics was held in Great Falls, Montana, on May 9 and May 17 under the sponsorship of the Cascade county medical society, with Dr. Earl L. Hall presiding as chairman. Similar courses will be given at Butte, Billings, Glendive and Helena. In charge of these courses is Dr. John Parks, chief of the department of obstetrics and gynecology at the Gallinger hospital in Washington. All these courses will be under the direction of the division of maternal and child health of the state board of health, in cooperation with the Montana state medical association.

Dr. W. H. Cuthbert of Hillsboro, North Dakota, joined the staff of the state hospital at Jamestown on June 1. He practiced in Hillsboro for the past 25 years.

Dr. E. A. Welden of Lewistown, Montana, has been appointed by Governor Ford to the Montana board of medical examiners to succeed Dr. A. T. Munroe who has moved to the state of Washington where he will practice. Dr. C. J. Bresee of Great Falls, Montana, has been re-appointed by Governor Ford a member of the state board of health.

Dr. Helen Jane Hare has become the medical partner of her father, Dr. Lyle Hare, at Spearfish, South Dakota. Dr. Helen Hare received her medical degree at Rush medical college in Chicago and her internship at Ames, Iowa.

Dr. C. E. McReynolds from Strasburg, North Dakota, will open an office in McClusky, N. D.

(Continued on second page following)

Necrology

Dr. Edwin J. Kauffman, 60, Marion, South Dakota, died on May 1 at his home.

Dr. Clifford S. Page, 68, Sisseton, South Dakota, died May 15 at Peabody Hospital, Webster, as the result of an accident a few months ago. Dr. Page was physician for the Indian agency. He was a native of Danbury, Connecticut, and had practiced at New Ulm, Minnesota, within recent years.

Dr. Hugo Neukamp, 68, Hosmer, South Dakota, was killed when his car collided with a gasoline truck June 1.

Dr. Carl A. Platou, 57, Valley City, North Dakota, died of a heart attack May 22, in Pompana, Florida. Dr. Platou served as a captain in the medical corps during World War I and came to Valley City in 1928.

Dr. Clarence W. Robertson, 54, died at Jamestown, North Dakota, May 31. He was a graduate of University of Illinois College of Medicine.

Dr. Lloyd B. Dochterman, 66, Williston, North Dakota, who died suddenly June 6, as the result of a ruptured blood vessel in the abdomen, following an emergency operation. He came to Williston in 1904 and has been in practice there continuously except for the time he was in the medical corps as captain in World War I.

Dr. Malcolm Graeme MacNevin, 78, former Butte, Montana, physician, died suddenly on a train en route to Palo Alto, California. Dr. MacNevin was a native of Canada, graduated from the University of Michigan and did postgraduate work at Johns Hopkins and abroad.

Dr. Carlton V. Norcross, 80, of Butte, Mont., died May 20 after a long illness. He was graduated from the University of Iowa and practiced for fifty years.

Commander Lloyd T. Sussex, 45, died of a heart attack at Farragut, Idaho, June 6. Dr. Sussex was a widely known physician in northern Montana, having practiced at Havre. He entered the navy more than three years ago, served in the southwest Pacific and took part in the battle of Tarawa.

Dr. Frank H. Hacking, 72, St. Louis Park, Minnesota, died June 2. Dr. Hacking had retired in 1936 because of illness. He had held many hospital and medical positions, was a director of the Hennepin County Tuberculosis Association and one of the founders of the Minnesota Association for Crippled Children.

Dr. John E. Curtis, 68, Lemmon, South Dakota, died May 6, at the Aberdeen hospital of a heart ailment.

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1. Marriott, W. McKim: "Infant Nutrition", revised by Jeans, Mosby, St. Louis, 3rd Ed., 1941.

2. Jeans, P. C.: "The Feeding of Healthy Infants and Children", J.A.M.A. 120:193, 1942.

*Recommended daily allowances—Committee on Foods and Nutrition, National Research Council.

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NEWS ITEMS (Continued from page 252)

Dr. G. A. Landmann, Scotland, South Dakota, has sold the Scotland clinic building to Dr. S. E. Namminga who has been his assistant for some years. Failing health has persuaded Dr. Landmann to reduce the extent of his practice.

Dr. D. C. Gates, Minneapolis, has been appointed assistant to the director of community war services, region 8. The regional staff office of community war services is a coordinating body, dealing with health, recreation and welfare problems in war-impacted areas in Minnesota, Iowa, Nebraska, North Dakota and South Dakota.

Dr. S. A. Slater, superintendent of the Southwestern Minnesota sanatorium since 1920, was elected first vice president of the Minnesota medical association at its recent Rochester meeting. Dr. Slater is president of the Minnesota public health association and a member of the executive committee of the national tuberculosis association.

Dr. Oliver W. Roberts, Owatonna, Minnesota, has closed his office for the duration and entered the service of the United States navy. Dr. Roberts has served as president of the Steele county medical association and as chief of staff of the Owatonna city hospital.

Dr. Daniel A. McDonald is the newly elected president of the Minneapolis Surgical society and will take office in October. Dr. Robert F. McGandy was elected vice president, Dr. Ernest R. Anderson, recording secretary and Dr. Orwood J. Campbell, treasurer.

Dr. G. H. Mesker, Olivia, Minnesota, now a lieutenant in the army, is stationed at Camp Savage, and will not return to his practice until after the war.

Dr. O. L. McHaffie, member of the Webber hospital staff of Duluth, Minnesota, has been appointed chief surgeon for the Missabe division of the Duluth, Missabe and Iron Range Railway Company.

Dr. D. H. Dewey, Owatonna, Minnesota, has been elected chief of staff of the Owatonna City Hospital. His assistant for the year is Dr. D. E. Morehead.

Captain J. E. Haes, Amboy, Minnesota, who left his practice to become an officer in the army a year ago, has received a presidential citation as a member of an air transport command group in the Pacific.

Dr. Wilbur A. Sawyer of New York has been appointed by Herbert H. Lehman director of health for the United Nations Relief and Rehabilitation Administration. Dr. Sawyer is assigned to Washington and he will be responsible for planning and directing health and medical activities for UNRRA. Dr. Sawyer has been director of the Rockefeller Foundation's International Health Division for the past nine years.

Dr. Robert B. Tweedy was elected president of the Winona General hospital medical staff at its annual meeting. Other officers named are Dr. Wm. Heise, vice president, and Dr. Geo. L. Loomis, secretary.

Dr. A. R. Blakey of Osakis, Minnesota, and Dr. E. J. Tanquist of Alexandria attended the annual meeting of the Park Region medical society at Fergus Falls. Dr. Blakey is the new president-elect of the society.

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The JOURNAL LANCET

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Fifty-Seventh Annual Session
Fargo, North Dakota
May 7, 8, 9, 1944

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PROCEEDINGS
of the
HOUSE OF DELEGATES
FIFTY-SEVENTH ANNUAL MEETING
of the
NORTH DAKOTA STATE MEDICAL
ASSOCIATION

First Session, Sunday, May 7, 1944

The House of Delegates convened in the South Room of the Gardner Hotel, Fargo, North Dakota, and was called to order at 8:00 P. M. by the Speaker, Dr. John H. Moore.

Dr. R. W. Van Houten, Oakes, chairman of the committee on credentials, announced that fifteen delegates had presented their credentials and were qualified.

The Secretary called the roll; fourteen delegates and one alternate responded, and the Speaker declared a quorum present. The delegates present were: Doctors J. H. Fjelde, Fargo; E. H. Boerth, Alternate, Buffalo; C. J. Gaspel, Grafton; W. A. Wright, Williston; P. H. Woutat, Grand Forks; D. J. Halliday, Kenmare; A. H. Reising, Wahpeton; A. W. MacDonald, Valley City; G. M. Constans, Bismarck; C. C. Smith, Mandan; R. H. Waldschmidt, Bismarck; R. W. Van Houten, Oakes; A. P. Nachtweg, Dickinson; W. W. Wood, Jamestown; and R. C. Little, Mayville.

The following qualified delegates and alternate delegates arrived shortly after the roll was called: Doctors W. E. G. Lancaster, Fargo; John C. Fawcett, Devils Lake; W. A. Liebeler, Alternate, Grand Forks; M. J. Moore, New Rockford.

Introduction of President

The Speaker introduced the President, Dr. Frank Darrow, who delivered the following address:

Mr. Speaker; Members of the House of Delegates: This is the beginning of a year of business that will probably start some very important things for the medical profession and, I hope, settle some questions which have been bothering the men all over the state. Whatever you do this year, put in a man that represents you in our Congress. When you send someone to the American Medical Association, stand behind him and tell the public that you stand behind him. If I get over to you at this time nothing but one point, I'll be satisfied. The one idea is that doctors are all individuals and no one can speak for them as a whole. It is a very sorry state of affairs. This can not happen if you back up your elected representatives. Without any further thoughts, I turn you back to your genial Master of Ceremonies, Doctor Moore, and I trust the proceedings will be very successful.

On motion made by Dr. Halliday, seconded by Dr. Waldschmidt and carried, the reading of the minutes of the 1943 session as published and circulated in the August, 1943, issue of the JOURNAL-LANCET were dispensed with and the minutes adopted.

REPORT OF THE SECRETARY

Dr. L. W. Larson, Secretary, presented his report as printed in the handbook. The report was referred to the Reference Committee on Reports of the Secretary and Special Committees.

The total membership for 1943 was 403. Of this number, 331 were paid-up members, 11 honorary members, and 61 members had their dues cancelled because of military service.

A comparison of last year's membership figures with the preceding four years is shown in Table No. 1. It is of interest to note that the total membership has remained almost stationary since 1939. The revenue from dues has decreased, especially during the past two years because of the relatively large number of members whose dues have been cancelled because of military service. It may not be possible for the Association to increase its reserve until the war is over and its revenue increases, because the cost of operation remains fairly constant.

TABLE No. 1
Comparison of Annual Membership

	1939	1940	1941	1942	1943
Paid memberships	394	387	374	366	331
Honorary memberships	3	11	12	10	11
Dues cancelled, military service	—	—	14	32	61
Total	397	398	400	408	403

Table No. 2 shows that the dues for 1944 are being paid promptly. To date 304 have paid their current dues and 26 are delinquent. Five new members have joined during the past year and 10 members have died.

TABLE No. 2

	May 5		April 20	
	1941	1942	1943	1944
Paid-up members	339	352	316	304
Honorary members	12	10	10	10
Dues cancelled, military service	—	31	58	59
Total	351	393	384	373

Field Work. Your Secretary has been unable to visit all the district societies during the past year. The reports of the Councilors indicate that the majority of the component societies are active and doing good work. Some of the smaller societies have had few meetings but their individual members have managed to attend several meetings of larger nearby societies. Your Secretary has noted an increased interest in medical economics on the part of the members of the societies he has visited.

Committees. Unfortunately the war has curtailed the activities of committees, especially during the past year. However, their reports, as published in the handbook, indicate that they are aware of the problems confronting our profession and are laying plans for solving them. The reports of the committees on Medical Economics and Maternal and Child Welfare are especially noteworthy this year and merit your earnest consideration.

E.M.I.C. Program. The news-letters sent out by the Secretary during the past year and the report of the Chairman of the Council in which the official action of the Council on this problem is stated, reveal that the official attitude of the Association toward this program has not changed since our last annual meeting. Pressure from lay groups and individuals caused the state health department to inaugurate recently a program which is acceptable to the Children's Bureau. The plan differs from the original plan submitted by the Children's Bureau a year ago only in a few minor details. It still contains the major points to which the Association has repeatedly offered its protests. The indications are that it will be accepted by individual physicians and hospitals, many with reluctance, because they are not in a position to do otherwise.

Opposition to the E.M.I.C. Program has mounted throughout the nation. Protests are flowing in to senators and representatives over the manner in which the program is being forced upon the profession by a federal agency, the ultimate objectives of which are questioned by many physicians. Your Association has joined in the fight to amend the appropriation for the Children's Bureau so that this agency will be forced to accede to the wishes of those who are to administer the services. Inasmuch as the majority of congressmen, especially representatives, are up for re-election this year it is likely that they will listen to their constituents more than they have in the past. A recent departure from the "rubber-stamp" type of congress is a hopeful sign.

Medical Economics. The Wagner-Murray-Dingell Bill (Senate Bill 1161) has crystallized the attention of the people on socialized medicine, in spite of the current war emergency. It is the culmination of forces, both in and out of government, which have grown in strength, especially during the past decade. Organized medicine, as exemplified by the American Medical Association, has been branded as reactionary and obstructive. The American Medical Association has fearfully and reluctantly acceded to the demands of a majority of its members in recently establishing an office in Washington. How much it can and will do, remains to be seen. Physicians in certain localities and regions in the country have become impatient with the conservative attitude of the American Medical Association and have formed organizations for the specific purpose of influencing national legislation as it pertains to medical practice. The American Association of Physicians and Surgeons is the most vociferous. The United Public Health League, formerly the Western States Public Health League, which is sponsored primarily by California physicians, but also includes physicians from the

states of Arizona, Colorado, Idaho, Nevada and Utah, is establishing an office in Washington. It seems a pity that a united front cannot be presented by a single organization, such as the American Medical Association. The latter, however, has refused to depart from its stated purpose of being primarily a scientific organization and unless it changes its program, it may see the development of another national organization devoted entirely to the solution of the problems of medical economics.

The recent survey of public opinion made by the National Physicians Committee revealed the following:

- (a) The medical profession is most highly esteemed.
- (b) The people do not want "political medical care," but
- (c) They demand a method of easier payment of the costs of unusual and/or prolonged illness.

If this survey is indicative of public opinion, a means for insurance against the hazards of illness must be provided. The important point is the form that this insurance is to take. Proponents of the Wagner-Murray-Dingell Bill insist that it must be compulsory and that only government can provide it. Organized labor (CIO and AFL) agrees. The Wagner-Murray-Dingell Bill probably will not be passed in its present form, but concessions to pressure groups may result in a compromise which will lead to a broadening of the program later, unless ways and means can be devised to stop it. This will involve the development of more prepaid medical and hospital insurance plans sponsored by physicians and hospitals, and the entrance of more insurance companies into the field of health and accident insurance. There may be a grave question as to which group, physicians or the public, is responsible for the development of a sound plan of voluntary health insurance, but that there is need for concerted action on the part of both public and profession is apparent, if medical chaos is to be averted.

North Central Medical Conference. This is an organization of physicians from Minnesota, Wisconsin, Iowa, Nebraska, North and South Dakota, who are either officers or members of their State Medical Associations and are interested in the problems of medical economics, which are national and also regional in their effects upon the practice of medicine. It was this organization which began the campaign to broaden the program of the American Medical Association by the establishment of a Washington office. Representatives from each state attended the Congressional Conference held in Minneapolis last August, which is summarized in the report of the Chairman of the Council. Your Secretary was honored by being made President of the Conference for this year and believes that the Conference merits the support of our Association. The Conference can discuss economic problems of mutual interest, and by presenting the united front of its six member states, will warrant the respect for its views of those in government circles who are to determine the future of the practice of medicine in this country.

RECOMMENDATIONS

1. That the Committee on Public Policy and Legislation be authorized to submit a pointed questionnaire on questions of medical economics to all candidates for nomination to congressional offices this year, and that photostatic copies of the answers be sent to the members of the Association;

2. That the Council be requested to allot \$50.00 per year to the North Central Medical Conference;

3. That the following resolution be submitted and adopted; Whereas the program now in operation for maternal and infant care for wives and infants of enlisted men in the four lower grades is unsatisfactory to the medical profession, and

Whereas the emergency provisions for the carrying on of the program as now in operation expire June 30, 1944, be it therefore

Resolved, that the House of Delegates of the North Dakota State Medical Association recommends that on that date Congress abandon the program as now constituted, and be it further

Resolved, that under any new program after June 30, 1944, the benefits be designated supplemental aid and take the form of an allotment for medical, hospital, maternity and infant care, similar to the allotments already provided for the maintenance of dependents, leaving the actual arrangements with respect to fees to be fixed by mutual agreement between the enlisted man's wife and the physician of her choice, and be it further

Resolved, that the American Medical Association be urged to present to the appropriate committees of Congress a concrete plan embodying this principle, to the end that the present and ultimate best interests of the wives and infants of men in service be served during the present emergency.

REPORT OF THE TREASURER

Dr. W. W. Wood gave his report as published in the handbook. Since this report was a part of the report of the Council, the Speaker referred the report to the Reference Committee on Reports of the Council, Councillors, and Delegate to the American Medical Association.

REPORT OF THE CHAIRMAN OF THE COUNCIL 1943-1944

Dr. N. O. Ramstad, chairman, presented the following report which was referred to the Reference Committee on Reports of the Council, Councillors, and Delegate to the American Medical Association:

Annual Meeting of the Council May 29, 1943

The Council of the North Dakota State Medical Association met during the annual meeting of the Association in Bismarck, May 9, 1943. Eight members were present.

President A. R. Sorenson addressed the Council about various matters of interest to the medical profession.

Secretary L. W. Larson reported regarding the Procurement and Assignment Service of which he is state chairman. He also presented a list of the property in the Secretary's office. At the present time the value after depreciation is \$97.09.

Treasurer W. W. Wood presented his annual report which was referred to an auditing committee consisting of Doctors Archie McCannel and P. H. Burton.

The second meeting of the Council was held on May 10, 1943. The auditing committee reported that they found the Treasurer's books and accounts to be correct. This report was approved by the Council. The bonds of the Secretary for \$2,000.00 and the Treasurer for \$5,000.00 were ordered renewed.

Appropriations for the year beginning April 1, 1943, were authorized not to exceed the following amounts:

Committee on Tuberculosis	\$ 50.00
Stenographer — state meeting	100.00
Emergency Fund to be expended by the Chairman of the Council as needed	100.00
Emergency Fund for the Council	250.00
Annual meeting in Bismarck	200.00
Delegate to the A.M.A. meeting with the understanding that he is to submit itemized statement	125.00
JOURNAL-LANCET	not over 800.00
Secretary, including stenographer	1,200.00
Postage and office supplies	150.00
Telephone and telegrams	35.00
Travel expense	150.00

Total \$3,160.00

An Editorial Committee for the JOURNAL-LANCET was appointed consisting of Dr. W. H. Long, Dr. Harry D. Benwell, Dr. G. W. Toomey and Dr. J. O. Arnson.

A committee to approve the publication of association transactions in the JOURNAL-LANCET was appointed consisting of Dr. L. W. Larson, Dr. J. O. Arnson and Dr. N. O. Ramstad.

Dr. George M. Williamson was elected Secretary and Dr. N. O. Ramstad Chairman.

On August 16, 1943, Secretary L. W. Larson and the Chairman of the Council attended a conference in Minneapolis between senators and congressmen of five states in this area and representatives of business and professional men of these states. Medical men from these states met, planned what should be presented by the medical profession, and appointed Dr. A. W. Adson of Rochester, Minnesota, to represent them at the meeting. Dr. Adson made an admirable address before the conference in which he outlined the views of the medical profession on many problems and answered the questions put to him by the senators and congressmen who were present. I believe that

this conference did much to develop a better understanding between the doctors of the northwest and the members of congress from these states.

President Frank Darrow appointed a committee consisting of Dr. John H. Moore, Dr. J. F. Hanna, and Dr. N. O. Ramstad to confer with representatives of the North Dakota Hospital Association and with Dr. F. J. Hill and others representing the North Dakota state public health department in order to consider the Emergency Maternal and Infant Care Program of the United States Children's Bureau. This committee met in Fargo on September 12, 1943, and agreed on a plan which they believed would be satisfactory to the public, the medical profession in the state, the hospitals, and the state health department. It recommended a modification of the Children's Bureau plan as follows:

"It is proposed by the North Dakota State Medical Association that such funds as may be allocated by the Children's Bureau under Title V Part 1, E.M.I.C., Fund E, be administered as follows:

1. A stated allotment for maternity and infant care, similar to the allotments already provided for the maintenance of dependents of men in the Armed Forces of the fourth, fifth, sixth, or seventh grades, be made, leaving the actual arrangement as to the amount of fees to be fixed by mutual agreement with the wife and the physician of her choice.

2. This allotment shall be \$50.00 for medical maternity care and not to exceed \$10.00 per week for medical infant care for a total of not over five weeks in any one illness.

3. Upon completion of the maternity care, the wife of the service man shall make application to the state director of the Maternal and Child Hygiene Division of the North Dakota state department of health for her allotment, or, similarly, in the case of illness of the infant under one year of age, for the allotment to which she is entitled at the termination of that infant's illness, and shall supply, at the same time, the necessary documentary evidence of her husband's military status.

4. When adequate proof of claim for the allotment has been submitted, the director of the Maternal and Child Hygiene Division of the North Dakota state department of health shall prepare the proper voucher for the woman's signature and, after proper notarization, this voucher shall be submitted to the North Dakota state auditor for payment from the state's share of Fund E, allocated for this purpose.

5. Recognizing the need for consultation service, it is recommended that a plan for consultation service be developed by the state health department in cooperation with the state medical association."

On September 17, 1943, President Frank Darrow requested a special meeting of the Council to consider the Emergency Maternal and Infant Care program and the plan recommended by the committee of the state association.

A special session of the Council was called and met in Fargo on October 3, 1943. Seven members of the Council attended. There also were present President Frank Darrow, Secretary L. W. Larson, Capt. A. C. Fortney, representing the State Selective Service, Dr. W. W. Wright, Chairman of the Committee on Medical Economics, Dr. J. F. Hanna, Dr. F. J. Hill, state Health Officer, and Dr. T. Q. Benson of Grand Forks. The North Dakota State Hospital Association was represented by Mr. Tollefson of Fargo and Mr. Overland of Grand Forks.

Secretary L. W. Larson discussed the Maternal and Infant Care Program and the various developments to date. He called attention to the fact that the House of Delegates, at its last meeting, had rejected the plan as submitted. The Council and others present discussed thoroughly the plan submitted by the committee after considering each paragraph carefully. The plan was adopted by the Council with instructions that it be submitted to the proper authorities through Dr. F. J. Hill, state health officer.

On November 15, 1943, Dr. F. J. Hill received notice from the Children's Bureau that they could not approve the plan submitted by the Council. The more recent developments are covered in the News Letter to all members sent by Secretary L. W. Larson on March 14, 1944.

Respectfully submitted,

Signed: N. O. RAMSTAD, M.D.,
Chairman of the Council.

REPORTS OF COUNCILLORS

The following Reports of Councillors as published in the handbook were referred to the Reference Committee on Reports of the Council, Councillors, and Delegate to the American Medical Association.

First District

CASS COUNTY MEDICAL SOCIETY. Since the last meeting of the state association it has had a few changes in membership. Drs. J. B. James of Page, and H. J. Skarshaug of Washburn, have died. One new member was elected in 1944, Dr. C. O. Heilman of Fargo. At present there are fifty-one members in civilian practice and thirteen in the armed forces. Membership of two doctors was discontinued during 1943 for failure of payment of dues. Both of these have moved elsewhere.

The Society has attempted to improve the standards of its scientific programs and has had a number of speakers from out of the city during its monthly meetings. Attendance has been good. A major portion of the discussion at the meetings has centered around medical economics, particularly in the matter of maternal and child welfare.

Because of the increased cost of food, etc., and the decreased membership, local dues have been raised to ten dollars, making a total of twenty dollars a year.

For the last few months the Society has been active in making preparations for the state medical meeting to be held in Fargo.

RICHLAND COUNTY MEDICAL SOCIETY. The following report is submitted by Dr. A. H. Reisinger, Secretary:

"I might say that there are only seven active men left in the whole county and practically all that we have done has been to hold our little society together. We have visited the Cass County Medical Society as often as practical. We have not had any meeting this past year, except business meetings."

L. A. NASH, M.D., *Councillor.*

Second District

DEVILS LAKE DISTRICT SOCIETY completed a very quiet year. There were only three meetings held during 1943. The programs were largely routine business, with case reports by members, discussion of medical economics, and outside speakers on two occasions. Attendance at meetings has dropped appreciably since the war began, probably due to a combination of loss of membership and consequently more work for the rest to do.

This district has now five members serving with the armed forces, there are 21 active members, and one life member. Also, in this district there are five physicians apparently not interested in society membership.

Loss in membership over the past year, due to death, numbered three men. These included: Dr. A. O. Arneson, McVillie; Dr. W. C. Fawcett, Starkweather; and Dr. K. Olafson, Cando.

Although in the past we have had but four regular meetings each year, an attempt is now being made to have a meeting every two months.

JOHN C. FAWCETT, M.D., *Councillor.*

Third District

GRAND FORKS DISTRICT MEDICAL SOCIETY has had a good year, chiefly because it is officered by men who have provided interesting programs for each meeting, and a high average of attendance of members from all parts of the district.

There are 59 registered physicians in this district, five of whom are honorary members and three others belong to adjoining societies. The boundaries of this district were arranged many years ago before the advent of the automobile and good roads. I again suggest that the boundaries of the various state societies be re-arranged along convenient auto roads to conform to the place of meeting, this making it possible for men to belong to societies most convenient to their place of practice. I urge careful consideration by our officers for the coming year of this problem. Another matter which should receive consideration is the plan under which our state society is working. Our constitution and by-laws were changed a few years ago so that the entire business of the Association is done by the House of Delegates consisting of about 19 members, usually half of this number is attending as a delegate for the first time, reports of standing committees are presented, some of which are very important, and of interest to every member in attendance, these

reports are referred to reference committees and nothing further is heard from them so far as the rank and file of the association is concerned. Why not return to our former plan of doing business with members of the Council, many of whom have served their districts for many years and who understand and know the needs and desires of all members, taking point to urge all members in attendance to attend the business meeting. Ours is a small society, anything that can be done to stimulate interest throughout the state is helpful.

At this time I wish to thank the Association for the honor of serving this Council for many years, I have given much thought and time to affairs of medicine in our state. My term as councillor expires this session, and I ask that my name be not considered for re-election. It is not that I have lost interest, but I would like to have a younger man take the place I have had for a long time.

G. M. WILLIAMSON, M.D., *Councillor*.

Fourth District

NORTHWEST DISTRICT MEDICAL SOCIETY has had a very successful year. We have had regular monthly meetings, with one exception when the weather interfered with our plans. The meetings have been well attended and the members have shown a keen interest in the business of the Society.

The meetings have been held alternately at Trinity and at St. Joseph's Hospital, except during the midsummer months. A brief summary of our meetings follows:

January 28, 1943. A dinner meeting was held at St. Joseph's Hospital. Dr. Olaf Haraldson and Mr. Bavonne of the Minot health unit discussed slaughtering plants from the standpoint of meat inspection facilities.

February 2, 1943. At a dinner meeting at Trinity Hospital, Dr. G. S. Seiffert discussed nail polish dermatitis.

March 25, 1943. Meeting at St. Joseph's Hospital. Mr. Neil Weber, Professor of Entomology at the University of North Dakota discussed ant-borne diseases and the recognition of various types of ants.

April 29, 1943. Meeting at Trinity. Mr. Eagles of Fargo, District Representative of the Blue Cross Hospital Plan, explained the plan thoroughly.

May 25, 1943. There was a dinner meeting at St. Joseph's Hospital, with a general discussion. No paper was given.

June, 1943. A picnic was planned at the Country Club, but a long period of rainy weather forced cancellation of the meeting.

July, 1943. A picnic was held at the Minot Country Club. There was no scientific program.

August, 1943. Dr. Wheelon put on one of his famous chicken dinners at the Country Club. No scientific program.

September, 1943. At a dinner meeting at St. Joseph's Hospital, Dr. White of the Minot Health Unit discussed restaurant sanitation, and showed a film on the treatment of syphilis.

October, 1943. The meeting was at Trinity Hospital. Dr. Stanley R. Maxeiner, assistant professor of surgery at the University of Minnesota, gave a paper on abdominal trauma.

November, 1943. The meeting was at St. Joseph's Hospital. Dr. J. K. Anderson of Minneapolis gave a paper on the management of proctological problems from the office standpoint.

December, 1943. Meeting at Trinity Hospital. Talk on encephalography by Dr. R. E. Dyson. Election of officers.

During the year three members were transferred to other societies, and three new members were admitted. One member, Dr. Olaf Haraldson, was lost by death. Twelve of our members are now in the armed forces. There are now forty-one members in good standing in the society.

ARCHIE D. McCANNEL, M.D., *Councillor*.

Fifth District

Herewith is the report of the Fifth District Society for the year 1943-1944:

Officers of the society elected at the annual meeting in January, 1944, were as follows: President, A. W. Macdonald; vice president, J. Van Houten; secretary and treasurer, C. J. Meredith; board of censors, Fred Brown, L. Almklov, and C. A. Platou; delegate to state convention, A. W. Macdonald; alternate, Fred Brown.

Our society now has a membership of ten, five less than in 1941. We have lost one member by death, and another is temporarily incapacitated by illness. We gained one new member, Dr. J. P. Merrett, by transfer from the Southern District society. Dr. E. L. Sederlin was a member for a few months, transferred to our Society from the Cass County society, and later obtained his demit to transfer to an eastern United States society. Two of our members, Dr. Paul T. Cook and G. Alfred Dodds, are in military service.

Four meetings were held during the year. Matters discussed and acted on were as follows: Physical examination of grade and high school children in the Valley City schools by the local physicians was arranged for; a proposal to have a representative of the medical society on the county welfare board was rejected; a discussion of the Emergency Maternal and Infant Care Program; proposals by the divisional state health department to have the cooperation of the physicians in pre-school conferences, and to have the local physicians conduct immunization clinics were rejected.

Because of our small membership, and the distance to be traveled by some of our members, no scientific programs were planned; but some of our members attended two of the scientific meetings of the Scutsman County society, and two of the Cass County society.

Valley City is seriously affected by the physician shortage, there being now only five men in general practice, two of whom have reached an age necessitating a limitation of their physical activities. One physician in our district is not a member of the society. We still have one unlicensed individual practicing medicine at Dazey, North Dakota; this in spite of repeated requests by our society to the State Board of Medical Examiners to effect his removal.

Excellent harmony and cooperation prevails in the society.

Respectfully submitted,

C. J. MEREDITH, M.D., *Councillor*.

Sixth District

Four meetings of the Sixth District medical society were held during the past year. The meetings have been well attended, the programs have been good and the professional and business affairs of the Society have been efficiently conducted.

The officers of the society are: President, Dr. M. S. Jacobson, Elgin; vice president, Dr. P. W. Freise, Bismarck; secretary-treasurer, Dr. W. B. Pierce, Bismarck; censors, Drs. W. H. Bodenstab, F. B. Strauss and G. R. Lipp, Bismarck.

The delegates to the House of Delegates are: Dr. C. C. Smith, Mandan; Dr. R. H. Waldschmidt, Bismarck; Dr. G. M. Constans, Bismarck.

The total paid membership is sixty-six.

Papers presented during the year are as follows:

"Infant Mortality Rate in Five Years of County Practice," Dr. M. S. Jacobson, Elgin.

"Pyelitis Cystica," Drs. N. O. Brink, H. M. Berg, and L. W. Larson, Bismarck.

Demonstration of Results from Radiation Therapy—Dr. W. H. Stenstrom, University of Minnesota.

"Atypical Pneumonia," Dr. Adolph Rumreich, Chicago.

"Recent Progress in Nasal Treatment," Dr. G. A. Larson, Fargo.

Mr. A. B. Crisler, district supervisor of the narcotic bureau, discussed the Harrison narcotic act.

Movie—"Caudal Anesthesia in Obstetrics," by the Eli Lilly company.

The following doctors from this area are in the Medical Corps of the United States Army: Drs. R. W. Henderson, C. A. Arneson, Donn R. Driver, Robert F. Nuessle and G. S. Ahern, Bismarck; Dr. M. F. Williams, Linton; Dr. Ralph Vinje, Hebron; Dr. A. J. Swingle, Mandan.

In the medical corps of the United States Navy is Dr. G. E. Doty, Jr., Bismarck.

During the year we have lost by death Dr. R. C. Thompson of Wilton and Dr. H. J. Skarshau, Washburn.

The burden on the physicians of the district has been unusually heavy because of the absence of so many in the service of our country. They have all done their utmost to see that the public is given every possible medical care during the existing emergency.

N. O. RAMSTAD, M.D., *Councillor*.

Seventh District

I beg leave to present the following report of the condition of the **SRUTSMAN COUNTY MEDICAL SOCIETY** for the year 1943.

There are twenty-one physicians licensed to practice in this county. Nineteen are actively practicing at the present time, two men are in the service.

We have had two meetings during the year. Dr. Sederlin, district health officer, gave a very comprehensive report of the findings in the course of examining the sixth and ninth grade pupils of the schools of the county.

At our second meeting Dr. M. Dockerty of Rochester, Minnesota, gave a very interesting talk with photographic slides on the subject of "Endometriosis".

The following officers were elected: President, Dr. J. Sorkness; vice president, Dr. F. O. Woodward; secretary and treasurer, Dr. E. J. Larson; delegate, Dr. W. W. Wood; alternate, Dr. C. W. Robertson; censor for 3 years, Dr. F. O. Woodward; censor for 2 years, Dr. T. L. DePuy; Censor for 1 year, Dr. George Holt.

The attendance at the meetings has been very good, averaging around fifteen per meeting.

Respectfully submitted,

P. G. ARZT, M.D., *Councillor*.

Eighth District

Due to the small number of members in the **SOUTHERN DISTRICT SOCIETY** there have been no meetings during the past year. However, some of the members have attended meetings in neighboring districts.

Officers for the year are: President, Dr. F. E. Wolfe, Oakes; secretary-treasurer, Dr. H. J. Meunier, Oakes; delegate, Dr. R. W. Van Houten, Oakes; alternate, Dr. F. E. Wolfe, Oakes.

There are at present six paid-up members of the Southern district.

F. W. FERGUSSON, M.D., *Councillor*.

Ninth District

The **TRI-COUNTY MEDICAL SOCIETY** has felt the pressure of work and travel restrictions during the past year. Only two meetings were held.

At the October meeting, Dr. Harry Fortin, on a hunting trip, was entertained and spoke to the Society.

In January the Society met for the election of officers.

At both meetings, the discussion centered around the Wagner bill and obstetrical care for soldiers' wives.

The Society voted to contribute to the National Physicians' Committee.

All qualified members of this district are society members.

Respectfully submitted,

A. E. WESTERVELT, M.D., *Councillor*.

Tenth District

The **SOUTHWESTERN DISTRICT** has had a successful year, during which four meetings were held. The scientific parts of the meetings were usually supplemented with movies of different obstetrical or surgical procedures. The meetings were well attended, even though one meeting had to be postponed because of bad weather.

At present we have 19 active members, 2 absent members, 1 non-member, and 2 members in the armed forces.

W. H. GILSDORF, M.D., *Councillor*.

REPORTS OF STANDING COMMITTEES

The following reports of Standing Committees were referred to the Reference Committee on Reports of Standing Committees.

Medical Education

In our report of 1943 we indicated certain anticipated changes because of the war situation. On account of the demands of the army and navy the school of medicine of the University of North Dakota has become a part of the specialized training program. It is in operation for forty-eight weeks of the calendar year. The forty-eight weeks are divided into four terms of twelve weeks each; three of these terms, thirty-six weeks, constituting an academic year. An entering class starts approximately every nine months, and the work of two academic years is accomplished in one-and-one-half calendar years. An academic year began with the summer term of 1943 and closed

with the winter term, March 25, 1944. A new academic year started at once and should close in December, 1944. Medical entrance and the professional training are tied up with the army and the navy pre-medical training programs. Until this time, the school has been pretty well able to select its own students, but from now on, so long as the present program continues, the quotas for army and navy will probably be assigned by the respective services.

In the two classes of the academic year starting in the summer of 1943 and recently closing, forty-three were accepted at once in the ASTP, the Army Specialized Training Program, five were accepted in the Navy V-12 program and nine were civilians. In the academic year that has just got under way, out of a total of fifty-two students in the two classes, thirty-three are in the ASTP, eight are in the Navy V-12 and eleven are civilians. Some of the latter group are expected to be accepted into one or the other of the specialized training programs.

Otherwise the plan and organization of the school remain as before. The school has been fortunate in being able to retain its faculty. Of the twenty-seven students finishing the curriculum offered at the university in March, 1944, all have been accepted for junior standing in other and complete medical schools.

H. E. FRENCH, M.D., *Chairman*.

Necrology and Medical History

Time is ever silently turning its pages and thus in annual session it seems fitting that we pause for a space and decorously pay our tribute of memory to those of our members who, since last we met, have ceased from their labors and at the same time extend to those who mourn their passing our meed of sympathy and comfort in this, the hour of their deepest sorrow.

Especially do we note the passing of many of our pioneers in medicine. They were in the field when the profession was young in this territory; they were courageous and always alert to the advances of their profession. Many were taken as a result of overwork in the present emergency. We regret their deaths, we glory in their lives of service.

GULICK O. BUNDY

Dr. Gulick O. Bundy, of Barton, North Dakota, died May 1, 1943, at a Rugby hospital. Dr. Bundy was a native of Spring Grove, Minnesota, but a resident of North Dakota for forty-three years. The last thirty years were spent in the field of his medical activity at Barton.

Dr. Bundy was graduated, class of 1904, from the College of Physicians and Surgeons, at St. Louis, Mo. He was licensed July 15, 1909.

CYNTHIA ESTELLE PINGREE MACNIDER

Dr. Cynthia Estelle Pingree Macnider, 85, died at a Jamestown hospital May 4, 1943, after an illness of a year's duration. She was a native of Maine but became a pioneer resident, having come to Dakota in 1888 shortly after her graduation in medicine. Excepting for one year spent in Mississippi and two years in California, Dr. Macnider practiced continuously in the state and was a resident successively at Fort Yates, Emmonsburg, Linton, Spiritwood, Bismarck and Jamestown.

She was placed at rest in the Fairview cemetery at Bismarck.

WALTER BYRON SCOTT

Dr. Walter Byron Scott, 70, of Ray, died at his home May 12, 1943. He had been in poor health for a long time.

He was graduated in medicine from Queens University in 1897 and was licensed the same year.

Dr. Scott knew much of pioneer medicine, coming to the state some forty-six years ago, from Canada. He was in practice at Crystal, before locating at Ray. Early trips through the country-side were made, as necessitated, with skis and the saddlehorse. His first appendectomy was performed by candle-light in a homesteader's sod shanty.

Dr. Scott held degrees in both pharmacy and medicine. He was a previous mayor of Ray.

Dr. Scott leaves a son, Walter K. Scott of Seattle, and a daughter, Mary Genevieve, who also lives in the west.

OLAF HARALDSON

Dr. Olaf Haraldson, 58, in practice for the past twenty years at Minot, passed away June 6, 1943, at the home of his brother Hafold at Northwood.

Dr. Haraldson was director of the Minot-Ward county public health unit at the time of his death and had practiced previously at Watertown, South Dakota, and at Northwood. He was a graduate of the University of North Dakota and Rush medical college in 1912. He registered July 4, 1913.

Dr. Haraldson was born at Northwood, and was a member of a group of Minot Shrine club members enroute to Grand Forks when he was stricken. Mrs. Haraldson, three brothers and two sisters are the survivors.

WILLIAM CROZIER FAWCETT

Dr. William Crozier Fawcett, 65, died June 21, 1943, at his home in Starkweather. He had been ill for a number of months.

Dr. Fawcett was born in London, Ontario, and was graduated from the University of Western Canada, in that city in 1901. He came to North Dakota soon following his graduation and located at Drayton, being associated with Dr. H. M. Waldren. He was licensed October 15, 1901.

October 3, 1902, Dr. Fawcett arrived at Starkweather, on the first train to serve that territory. There he remained in professional service for the rest of his allotted time.

Dr. Fawcett was a charter member of the Devils Lake medical society and was president of the state medical association, in 1924-25. He was a member of the state medical examining board and president of that body for five years.

Dr. Fawcett was deeply interested in professional, religious, and civic affairs, making splendid use of his talents in the betterment of mankind.

Survivors are Mrs. Fawcett and four sons, born to this union. All of these men became doctors. John C. and Newton W. are located in Devils Lake. Donald W. and Robert M. are in the service of their country, being members of the Medical Corps, A.U.S.

JOSEPH P. LA POINTE

Dr. Joseph P. LaPointe, 52, Harvey, North Dakota, died June 25, 1943, at his home city. Dr. LaPointe had been in practice at Harvey for thirteen years.

He was a native of Montreal, Quebec. He was a graduate of Laval University, Quebec, 1917, and licensed in North Dakota in January, 1929.

W. D. WAGAR

Dr. W. D. Wagar, 68, after an illness of several months, passed away at Michigan, where he had practiced for over forty years. His death occurred on July 25, 1943. He was born in Ontario, on November 8, 1875, and came to Dakota three years later.

Dr. Wagar attended the University of North Dakota and graduated in medicine at Minnesota, class of 1898. He was licensed July 14th of the same year. He first practiced at Crary before locating at Michigan in 1901.

Dr. Wagar leaves his wife, a daughter, a brother and two sisters.

CAMPBELL SANSING

Dr. Campbell Sansing, 70, formerly on the staff of the veterans hospital at Fargo, died April 4, 1943, at his home in Blossom, Texas. He had also practiced at the government hospital at Muskogee, Oklahoma, and at Courtenay and Valley City, both in North Dakota. He was a graduate of Tulane university, class of 1904.

Dr. Sansing had retired but a few months before his demise.

ZELLA WHITE STEWART

Dr. Zella White Stewart was born in New Brunswick, Canada, January 9, 1878, and died in Iowa City, Iowa, August 4, 1943.

She attended Allegheny college, Meadville, Pennsylvania, and graduated from Cornell medical college in 1904. In the same year she was married to Prof. G. W. Stewart of the University of North Dakota faculty and came to Grand Forks to reside and practice her profession, which she did from 1906 to 1911. In the latter year husband and wife moved to Iowa City where she practiced until 1938.

Dr. Stewart was a lady of culture and refinement and was held in high regard socially and professionally. She was a de-

voted student of medicine and in the later years of her life she specialized in allergy and was a pioneer in that department of medicine. She was a member of the American Association for the study of Allergy, and was regarded as an authority on the subject.

WILFRED F. LOWE

Dr. Wilfred F. Lowe, 40, former resident of Grand Forks, died September 11, 1943, at Jackson, California, following a heart attack. He had been in practice at Jackson for fifteen years.

Dr. Lowe was the son of the late Mr. and Mrs. J. W. Lowe of Grand Forks. After graduation from the University of North Dakota he completed his medical education at Rush medical school.

L. E. DEMKE

Dr. L. E. Demke, 46, senior surgeon of the U. S. public health service at Belcourt, died at Leland, Illinois, during the late summer. He was in the Indian service. Dr. Demke had been in ill health and was on sick leave from the service, accompanied by his wife and daughter, and at the home of friends, when he was stricken. He was a graduate of Loyola university, Chicago, 1926. He served during World War I.

ERNEST G. SASSE

Dr. Ernest G. Sasse, 73, died September 15, 1943, at his home in Lidgerwood. He was a native of Minnesota and graduated from Hamline university medical school in St. Paul, and had taken graduate work at the universities of Vienna and Berlin. He graduated in 1899 and was licensed July 14, 1904. With the exception of six years spent in Bridger and Bear Creek, Montana, Dr. Sasse had been in practice at Lidgerwood since 1904. He purchased the city hospital in 1913 and continued to operate it until his death. He held membership in many religious, fraternal and medical bodies.

Dr. Sasse leaves his wife and three sons, Maj. Bruce Sasse in the Panama Canal Zone, Douglas of Willmar, Minnesota, and Victor of Jefferson Barracks, Missouri.

EINER LOHRBAUER

Dr. Einer Lohrbauer, 78, died at a Grand Forks hospital, October 29, 1943, after 42 years of practice in Lakota. He came to the United States from Norway at the age of 19. He was a graduate of the University of Oslo, and in medicine, of Minnesota in 1901. Dr. Lohrbauer registered in North Dakota October 23, 1902. He operated a drug store in Grand Forks before locating at Lakota. He was mayor of that city for twelve years and had served in the legislature from Nelson county. He was county health officer for twenty-five years.

Surviving are his wife, one son, Dr. Leif T. Lohrbauer, and a daughter, Mrs. Louis Fallon of Grand Forks.

JOHN B. JAMES

Dr. John B. James, 56, died November 8, 1943, at his home in Page. Dr. James was graduated from Northwestern university, class of 1911, and interned at the county hospital in Milwaukee. He was licensed January 10, 1913. He located in Page in 1913, taking over the practice of the late Dr. Wm. Scanlan.

Dr. James never denied needed services to anyone. He was a lover of nature, flowers, and the wild life. He appreciated good music and good books. He was an ardent sportsman. He was the recipient in 1936 of North Dakota's safest driver's award.

Dr. James gave much of his time to civic affairs, holding membership in the Methodist church, the Masonic and Workman lodges, on the village board for many years and was a past president of the Community club.

He leaves a son, Capt. John Basil James, M.C., A.U.S., on duty in North Carolina, a daughter Annabel, and two sisters, besides Mrs. James, formerly Miss Gena Johnson, Cass county school nurse.

H. J. SKARSHAUG

Dr. H. J. Skarshaug, 45, of Washburn, North Dakota, died November 30, 1943, as a result of a hunting accident.

Dr. Skarshaug was graduated from the University of Iowa, in 1926. He served his internship at the California Lutheran

hospital, Los Angeles, and practiced for seven years at Decorah, Iowa, before locating in Fargo. He was health officer for the city of Fargo from 1935 to 1939. He had been in practice in Washburn for four years, when the fatal accident occurred.

Dr. Skarshaug leaves his wife and three children.

GUSTAV E. STROMBERG

Dr. Gustav E. Stromberg, 59, died December 21, 1943, at his home in Langdon. He was a native of Sweden, coming to Chicago with his parents when three years of age. After his graduation from the University of Illinois he came in 1911 to Loma where he practiced for two years. He was licensed January 12, 1911. He also was located for short periods of time at Dickinson and Taylor in western North Dakota. From February 1914 to the time of his death he was a practitioner at Langdon.

Dr. Stromberg was a pioneer in the use of the snow-plane and the airplane in the practice of his profession. He maintained a private hospital until a few years ago when, because of ill health, a lessening of his activity was necessitated.

Dr. Stromberg was an outstanding citizen of Cavalier county, health officer of the county and the city of Langdon for many years. He was a splendid public-spirited civic worker and kept up these contacts even in declining health.

Dr. Stromberg is survived by Mrs. Stromberg, two daughters and a son, Dr. Murry G. Stromberg, who is a first lieutenant, M.C., A.U.S., stationed at Fort Ord, California. Another survivor is Dr. Gordon Pettit, an officer in the dental corps, U. S. Navy.

WM. L. T. GOODISON

Dr. Wm. L. T. Goodison, 70, of Larimore, died in a Grand Forks hospital January 14, 1944. He had spent 50 years in Larimore and was widely known both as physician and lawyer. For many years he practiced medicine, later giving his time largely to law. He was at one time assistant attorney general of North Dakota.

Dr. Goodison received his medical education at Hamline university and Jefferson medical college, class of 1909. He was licensed October 14, 1909. He never married and there are no immediate survivors. He was a native of Newfoundland.

JAMES GRASSICK

For many years at the holiday season the numerous friends of Dr. James Grassick, of Grand Forks, North Dakota, received greetings in the form of a pamphlet which he himself prepared. This year, only shortly after this holiday message arrived, and while it was still being read, Dr. Grassick died, on December 19, 1943. His last message was entitled "Out of the Mists," in which he said: "I was born in a secluded glen in the highlands of Scotland, hemmed in by the everlasting hills where mists and shadows were much in evidence. To be out of the mists, meant not only dry footing, but a clearer view of the surrounding landscape, of the heathered hillsides, and gowaned meadows and other objects of beauty that were within range."

Born in Aberdeenshire, on June 29, 1850, he soon moved to Ontario, Canada, with his parents. After completing his public school work, he became a teacher and devoted his spare time to the study of medicine in the office of an Ontario physician. When he was thirty-five years old, he graduated from the Rush medical college in Chicago. He then attended lectures and clinics in the General hospital and in the Burnside lying-in hospital in Toronto. In the fall of 1888 he went to Buxton, North Dakota, where he was engaged in the practice of medicine most of the time until 1905, when he moved to Grand Forks. On numerous occasions Dr. Grassick did graduate work. In fact, after such work in 1888 the University of Michigan granted him the degree of Doctor of Medicine. In 1904 he traveled through the countries bordering on the Mediterranean, and through Switzerland, Germany, France, Norway, and Great Britain.

In addition to the practice of medicine of that day, Dr. Grassick had an unusual interest in public health, so much so, in fact, that in 1907 he was appointed state superintendent of public health and held that position for six years.

In 1909 he was elected president of the North Dakota Anti-tuberculosis Association and was annually re-elected to this

office for more than twenty years. He edited the *Pennant*, a monthly publication devoted to the interest of good health, with special emphasis on the cause, prevention, and cure of tuberculosis. This periodical had a circulation of more than 4,000 copies per month. He was a member of the board which selected the site for the North Dakota state sanatorium, and his interest in that institution continued throughout the remainder of his life. In 1917 Dr. Grassick was appointed University of North Dakota physician, and he conducted what was, in reality, a student health service, having a special dispensary for students. Indeed, he watched over the health of the entire campus and did much to control and prevent epidemics.

In 1923, because of their great admiration and respect for him, and as a recognition of his outstanding contribution to medicine, the North Dakota state medical association conferred upon Dr. Grassick its highest honor by electing him to the presidency. Although the official records of the North Dakota state medical association were destroyed by fire in 1911, Dr. Grassick set to work to record the history of the association, which was published in book form in 1926. His chapters on such subjects as the Pioneer Physician, "Doctors" Lewis and Clark, and the Irregulars, are classics. This volume can be read with profit by physicians everywhere.

The concluding sentence of Dr. Grassick's 1943 holiday message is, "Enough, if we are permitted to peer through the mist, catch a glimpse of the stars beyond and point the upward way." This he did all of his life. While helping others to live long, happily and successfully, he himself was an outstanding example, having attained the age of ninety-three years.

R. C. THOMPSON

Dr. R. C. Thompson, 67, of Wilton, passed away February 8, 1944, at a Bismarck hospital. For several weeks he had not been well but because of the need for medical services he was active until a week before his death.

Dr. Thompson was a native of Listowel, Ontario, and was a graduate of the medical school of Trinity college, Toronto, and soon thereafter came in 1901 to Wilton to practice his profession. This was the scene of his activity with the exception of one summer spent in Canada. He was licensed January 16, 1902. His kindness and thoughtfulness and the willingness to answer all demands on his time and talents, endeared him to all. Dr. Thompson was a member of the Presbyterian church, of the Bismarck Masonic lodge, Knights Templar and the El Zagal Temple of Shriners at Fargo.

Surviving are his wife, two sons, Walter M. of the navy, and John Sterling, flying instructor of the army, one brother and three sisters.

DANIEL H. BELL

Dr. Daniel H. Bell, 70, an early day practitioner of Kenmare, died December 23, 1943, at Tacoma, Washington, where he had been in special practice for a quarter of a century. After graduation from the university medical school of Kansas City, Mo., he located in Kenmare, there to practice for a period of ten years before removal to the west.

Survivors are his wife, a brother and a sister.

JAMES NOONAN

Dr. James Noonan, 25, of Valley City, died February 9, 1944, at Camp Barkeley, Texas. His death was caused by meningitis, after but two days illness. He attended the University of North Dakota and graduated in medicine from McGill university, Montreal, in January, 1943. He interned at Providence hospital, Seattle, Washington. He enlisted in the Medical Corps, A.U.S., was commissioned a lieutenant, and ordered to camp, on January 6, 1944.

Survivors are his wife, his parents and two brothers, Major Clayton T. Noonan and Lieut. (j.g.) Lawrence M. Noonan.

Lt. Noonan had prepared himself well for service in behalf of his country but was taken before this opportunity could be realized.

WILLIAM CAMPBELL

Dr. Wm. Campbell, 46, died February 21, 1944, at his home in Valley City. He had been in ill health for a year but had continued in practice until six months before his death. Dr. Campbell was born in Glengarry county, Ontario, February 15,

1898, and before graduation from high school enlisted in the Canadian forces in World War I. He served overseas and on his return finished his preliminary work and studied medicine at the University of Manitoba from which he was graduated in 1927. After serving his internship he located at Buffalo, North Dakota, but in 1928 moved to Valley City where he continued to practice until called from his earthly activity. He was a diplomate of the national board.

Dr. Campbell was especially interested in community health and was president of the county chapter, American Red Cross. He was a member of the Masonic and Knights of Pythias lodges, and Kiwanis. Dr. Campbell was highly esteemed by all, as friend, citizen and physician.

Survivors are his wife, a son, Ian, a sister and two brothers.

H. M. WALDREN

Dr. H. M. Waldren, Sr., 69, of Drayton, died February 22, 1944, at the University hospitals in Minneapolis. He had been in active practice until a few weeks before his death, though not in the best of health for a number of years.

Dr. Waldren was born in Kingston, Ontario, and graduated in medicine from Queens university in 1898. He was married soon after and moved to Winnipeg where he lived for a year before locating in Drayton. At Drayton he lived and practiced to the conclusion of his career. He was licensed July 13, 1899. Dr. Waldren established and managed the Drayton hospital for thirty-five years.

He was a member of the American College of Surgeons, president of the state medical association in 1931, and for many years a member of the state medical examining board. Dr. Waldren served his city as mayor on two occasions, was an energetic supporter of the good roads program, a civic leader, a sportsman, and in 1932 was illustrious potentate of Kem Temple, Nobles of the Mystic Shrine of Grand Forks. He was a member of the Masonic blue lodge of Drayton, the Scottish Rite and St. Omer commandery of Grafton and a member of the Royal Order of Jesters of Grand Forks. He was a member of the Odd Fellows and Woodman lodges of Drayton.

Survivors are his wife, two sons, Dr. George Waldren, of Cavalier, and Dr. H. M. Waldren, Jr., with whom he was associated in practice in Drayton, and a daughter, Mrs. Henry Heilman of Athens, Ohio.

CLARENCE S. PUTNAM

Dr. Clarence S. Putnam, 84, of Fargo, died February 25, 1944. He was a graduate of Hahnemann medical college, Chicago, class of 1897, and registered in North Dakota the same year.

Dr. Putnam having special talent along musical lines gave up the practice of medicine and became bandmaster of the N. D. A. C. and continued in this work until the time of his death.

Survivors are Mrs. Putnam and three sons, one of whom is in England with the air corps.

HENRY B. BEESON

Dr. Henry B. Beeson, 62, died late in March, 1944, at his home in Racine, Wisconsin.

He graduated from Hahnemann medical college, Chicago, class of 1912, and was licensed in North Dakota July 3, 1919. Dr. Beeson confined his work to the specialty—eye, ear, nose and throat, and was a member of a Grand Forks clinic, where he practiced.

He was a member and past president of the North Dakota Academy of Ophthalmology and Otolaryngology. He removed from North Dakota in 1930.

Survivors are Mrs. Beeson and three sons.

R. M. COX

Dr. R. M. Cox, 68, passed away at his home in Edmore, March 27, 1944. He had been in ill health for a long time. Dr. Cox was born September 15, 1875, in Lonford county, Ireland, and came to the United States when twelve years of age.

He held degrees in both osteopathy and medicine, graduating in the latter from Hamline university, and was licensed in North Dakota, July 13, 1905. Dr. Cox came to Edmore in September, 1905, and continued to practice his profession at this place until the time of his death. Burial took place at Graceville, Minn.

Survivors are his wife, two children, Capt. William L. Cox of Texarkana, Tex., and Mrs. Erling Berg of Mayville; three brothers, Jack and William Cox of Graceville, and Brig. Gen. Richard Cox of St. Petersburg, Fla., and two sisters, Mrs. Hubert Burns, Minneapolis, and Mrs. Joe Coyne of Graceville. Dr. Cox was a member of the Edmore Masonic lodge and the Kem Temple of Shriners of Grand Forks.

GEORGE M. WILLIAMSON, M.D., *Chairman.*

F. L. WICKS, M.D., *Collaborator.*

Public Policy and Legislation

The committee on Public Policy and Legislation has not been called together this year as there has been nothing of special importance to consider.

As a member of the Council, we met with the officers of the state medical association last fall in Fargo, to consider the program submitted by the Division of Maternal and Child Hygiene as applied to maternal and infant care of soldiers' dependents. After a thorough discussion of the bill as explained by Dr. Hill, and others, the proposal was not accepted by the state medical association. The association, in turn, made a modified proposal which was not accepted by the bureau. I understand that in the meantime a modified plan has been accepted, but our committee has had nothing to do with the matter since the original consideration of the subject.

There has been nothing of a legislative nature to consider this year as there has been no legislation.

We feel that there should be a general discussion before the state meeting regarding the status of a refugee physician. This is a matter with which every physician in the state should be familiar. It presents a serious problem which must be solved definitely in the near future.

ARCHIE D. McCANNEL, M.D., *Chairman.*

Public Health

The committee on Public Health was not asked to meet during the past year by the chairman due to the difficulty experienced by other chairmen to obtain good representation because of the inability of physicians to leave their practice.

In view of the endorsement of full-time health units by the American Medical Association, your chairman respectfully recommends that the House of Delegates *reconsider its action* at the Fifty-sixth Annual Session. The recommendation of the committee on Public Health was "That the House of Delegates give careful consideration to the provisions of Senate Bill No. 77 (Chapter 220 S. L. 1943), which is permissive legislation for providing full-time health districts, and request the members of the North Dakota State Medical Association to cooperate in promoting full-time public health units."

Your chairman, as representative of the North Dakota state department of health, wishes to express deepest appreciation to the physicians of North Dakota for their splendid cooperation in all health matters, and for their patience and understanding in these times of depleted personnel, when mistakes and delays in service are inevitable.

F. J. HILL, M.D., *Chairman.*

Tuberculosis*

The following is a report of the meeting of the committee held during the past year.

Members present were: C. V. Bateman, V. J. LaRose, W. L. Walbank, and J. O. Arnson.

Miss Helen Katen was present, representing the North Dakota Anti-Tuberculosis Association. She reported that the North Dakota association has made available an intercounty nurse whose function it will be to cooperate with the local health officers in any work that she will be able to perform. The follow-up of tuberculous cases will be part of her duties and her services are available through Miss LaCroix who has her headquarters at the state health department. The value of this type of service can be appreciated when one knows the situation as it arose at Powers Lake where a large number of tuberculous contacts developed active tuberculosis. The Powers Lake situation was discussed at considerable length by the committee and it was its opinion that the state health department should take the initiative in clearing up such situations as that which occurred at Powers Lake.

The question of utilizing microfilm in investigating tuberculosis met with favorable response from the committee. The committee was in favor of some such endeavor carried out in cooperation with the local physicians.

Any definite action on this matter was postponed until a later and more opportune time. The committee realizes there is some opposition in the profession to such a program and thinks it advisable that a campaign of education, both of the public and the profession, regarding what can be accomplished by small films, be carried out.

RECOMMENDATIONS

The committee wishes to stress the following ideals in our anti-tuberculosis campaign in North Dakota.

1. We advise stress being made on the examination and search for contacts of active cases.
2. We do not recommend check of students in school below high school age.
3. We highly recommend a symposium on tuberculosis in the local medical societies.
4. We recommend more education for the laity.
5. We recommend that all teachers be supplied with satisfactory pamphlets on tuberculosis which they may use as an accessory textbook.
6. The committee also recommended the use of the patch test routinely on all hospital admissions.

Dr. Wallbank stated that on Mondays and Thursdays the staff of the sanitarium presents a clinic on pneumothorax to which all members of the profession who are interested are invited.

At the time of our meeting North Dakota was one of the three states which have enough beds in the sanitarium to take care of all tuberculous cases requiring treatment in a sanitarium. However, recently the situation in the sanitarium has been changed because of the impossibility to get adequate help, and thereby the function of the sanitarium has been greatly curtailed. Dr. Wallbank has requested that in all cases advanced notice be sent to him before the patients are sent to the sanitarium. It is apparent under these handicaps that cases will not be kept as long as might be desirable and many cases will have to be discharged to home care under the local physician's supervision. The profession is asked to cooperate in this regard with Dr. Wallbank and the sanitarium.

J. O. ARNSON, M.D., *Chairman.*

*This report was not received in time to be considered by the House of Delegates.

Pneumonia Control

The Committee on Pneumonia Control met with the members of the state department of health in the capitol building at Bismarck on February 7, 1944.

In 1943 there were 2468 cases of pneumonia reported to the department of health as compared to 2944 cases of pneumonia reported in 1942. Of these 2468 cases, 525 were treated in the control group and 1943 patients were treated in the non-control group. Two hundred seventy-four chest films were taken on 253 individuals. The total cost of the program was \$3,890.57, divided as follows: Drugs, \$1,621.57; x-rays, \$1,189.00; typing, \$1,080.00. The average cost per patient of treatment in the control group was \$7.41, as compared with \$5.60 in 1942.

The committee makes the following recommendations:

1. The state department of health should continue to supply antipneumococcal serum to physicians since druggists no longer stock it.
2. Only types 1, 2 and 3 antipneumococcal serum shall be available at all typing stations. All other types of serum are to be procurable at the public health laboratories located at Bismarck and Grand Forks.
3. A maximum fee of \$15 be allowed for chest x-rays on a single pneumonia patient, which means that a physician would be paid for a maximum of three films.
4. Sulfamerazine should be added to the list of drugs supplied by the state department of health.
5. The pneumonia technicians conference should be continued as in the past.

6. Local typing station technicians should be requested to speed up the reporting of sputum typing to physicians, and should report negative results just as promptly as positive results, directly to physicians.

PAUL H. ROWE, M.D., *Chairman.*

Cancer

The Committee on Cancer has not had a meeting during the past year so this report represents the views of its chairman only.

Cancer continues to be a leading health problem. It is second only to heart disease as a cause of death in North Dakota. About 163,000 persons died from cancer in the United States in 1942, of which North Dakota contributed 620.

Early cancer is curable—of this there is no doubt. The problem, therefore, is to recognize and treat cancer in the early stages of the disease. Education of the public and the physician is the most potent weapon we have to defeat the menace of cancer. The American Society for the Control of Cancer and its subsidiary, the women's field army, is expanding its educational program, stressing that cancer is curable if treated early and what the danger signals are. The Women's Field Army in North Dakota, under the able leadership of Mrs. J. W. Snyder, state commander, is organized in almost every county and is doing a splendid job. The cooperation of the individual physicians in the state has not always been what it might be. Some physicians have viewed with skepticism the program of a lay organization dedicated to the effective control of cancer. They would do well to study the objectives of the women's field army and to offer assistance to its county workers. They will find that the educational material distributed by this organization emphasizes only accepted facts and urges people to consult their family physician whenever the danger signals, that may mean cancer, appear.

The responsibility of the physician in the control of cancer does not end with the support which he may give to the women's field army. He must, in addition, become "cancer minded," so that, when a patient comes to him with signs of cancer, he will do a thorough physical examination and will demand that the patient subject himself to special diagnostic procedures in order that the early case may be diagnosed. This is particularly true of biopsies of the cervix and endometrium, and gastrointestinal x-ray studies. If cancer is to be controlled, physicians cannot resort to "curbstone consultations" or to the pernicious practice of telling a lay person, who comes to him because of some danger signal which he has been told about or reads in the women's field army literature, that he is merely worried and should forget about it.

The component medical societies are again urged to devote at least one program a year to the early diagnosis and treatment of cancer.

L. W. LARSON, M.D., *Chairman.*

Fractures

No meeting of the Committee on Fractures was held during the year of 1943. Consequently, there is no additional data to report.

There were several communications from Dr. Charles Scudder of Boston requesting a continuation of the fracture work in the various hospitals as previously outlined.

R. H. WALDSCHMIDT, M.D., *Chairman.*

Crippled Children

The Crippled Children's Bureau of the state has apparently been functioning satisfactorily as there have been no problems arising necessitating the meeting of this committee. If there have been any objections or complaints on the part of any practitioners of the state, this committee would be glad to know of them.

A. R. SORENSON, M.D., *Chairman.*

Medical Economics

Prior to our last annual meeting we had discussed with Mr. E. A. Willson, executive secretary of the North Dakota public welfare board the question of a revision of the welfare board fee schedules. These discussions were continued and a new fee schedule drawn up, a copy of which has been mailed out

to all doctors of medicine in the state. In preparing this schedule we desired to achieve two objectives:

1. A more realistic rate of payment.
2. To bring together into one uniform, comprehensive, overall schedule the various activities and programs of the public welfare board relating to every kind of medical care.

It is our belief that these objectives have been accomplished and we would like to draw the attention of the House of Delegates to the following facts:

1. Use of this schedule is mandatory in all cases where the entire bill is being paid by the state public welfare board.
2. The various county welfare boards are advised by the state welfare board to accept this schedule but they are not necessarily obligated to do so.

Accordingly we would like to suggest that each delegate see that his district medical society make every endeavor to have this schedule adopted in the various counties.

I would like to express the appreciation of this committee for the splendid cooperation we have had from Mr. E. A. Willson, executive secretary of the state public welfare board. Both in the preparation of this schedule and in our many dealings with him over the past years, we always have found him to be fair, honest and courteous.

At the present time the medical profession is greatly concerned with several aspects of what, after all, are the same problem. In essence this problem can be stated as to how the method of medical practice is going to be changed or modified in the coming years. There is a desire on the part of the public to escape, prepay, budget or in some manner provide for medical care on other than a fee for service basis. Such proposed changes are of two main types:

1. Government control.
2. Prepayment plans as sponsored and controlled by: (a) medical groups, (b) in connection with hospital insurance, (c) by private individuals, lay or medical, and by industrial organizations.

Government control: You all have heard of the Wagner-Murray-Dingell bill which proposes a system of state medicine under the direct control of the surgeon general of the U. S. public health service. From all the information available at this time it can be stated that this bill will not be passed in its present form at this session of congress and it is unlikely that any similar bill will be passed. In connection with this problem of government control I would draw your attention to the fact that a comprehensive scheme of national health insurance has been introduced in the Canadian parliament, will pass, and probably will be operating within a year. This with the tacit consent of, or at least without active opposition from, the Canadian Medical Association.

Prepayment plans: The medically controlled prepayment plans in some instances have had rather hard going and, while not successful in every respect, show promise for the future. The most important plans are those of California and Michigan. It does not seem to us that the time is ripe for us in North Dakota to sponsor a comprehensive prepayment plan.

(a) Hospital prepayment plans have shown a tendency to add some medical and surgical benefits to their programs. Some members of the profession deprecate this practice and others consider it to be good.

(b) Various industrialists, notably Henry Kaiser, have introduced prepayment medical care for their own workers. This, after all, is only an extension of contract practice and hardly can be considered a successful innovation because the care is given to employees only and does not include the families. It is a well known fact that the rate of illness is lower among active employed individuals. Our problem then is how best to guide and control the changes which are probably inevitable. To do this we must have good leadership. Discussion of this problem covers a great deal of ground and much of it concerns how well or poorly our organization, the A.M.A., has done its job.

Criticism of the A.M.A. within the profession mainly concerns itself with the manner in which our interests are presented to the government in Washington. Many people within

and without the profession believe that our interests would be better served if we maintained an office in Washington which would function actively to give congressmen information as to our attitude on impending legislation. Such an office would be a two-way affair, on the one hand present our views to congressmen, senators and government bureaus and on the other informing the profession as to legislative trends and enlisting their support as needed. Experienced legislators unanimously agree that such an office is vital to our interests.

You may recall that a year ago we instructed our A.M.A. delegate to join with other delegates in urging the establishment of such an office. He will report to you that this failed of approval in the A.M.A. House of Delegates. Instead a new Council on Medical Service and Public Relations was set up. It is reported that this council contemplates some sort of a Washington office, but for one reason or another the higher officers of the A.M.A. seem to be opposed to such a move and unless their attitude changes it does not seem likely that this committee will represent us very effectively in Washington.

There are now three other organizations entering the field of public relations for the medical profession. They are:

1. The National Physicians Committee. This committee has done a great deal of work in the public relations field in the way of good newspaper publicity and has collected much data. Their recent survey of the general public's desires in the matter of medical care is interesting and instructive. It is probable that they were partly instrumental in the recent action of the American Bar Association in condemning the Wagner-Murray-Dingell Bill. So far as we are aware they have not carried on any direct activity in the legislative field.

2. The Western Public Health League. This organization originated in California where they have had much successful experience in combating pernicious legislation. Several of the western states have joined with the California Public Health League to form the Western Public Health League. On March 25th they opened an office in Washington headed by their public relations expert, a newspaperman, for the purpose of representing the medical profession of the western states.

3. The Association of American Physicians and Surgeons, originating in the Lake County Medical Society, Gary, Indiana. They propose to enroll as many medical men as possible and to carry on public relations and legislative activities. At the present time the outlook for this organization is uncertain.

To most of us it would seem desirable to have all matters pertaining to legislation and public relations carried on within the general framework of the A.M.A. organization. After all, this is our parent organization and it is up to us to try to influence its policy in the usual democratic manner. At the meeting of the National Conference on Medical Service, February 13, 1944, a resolution was passed urging that the council on Medical Service and Public Relations establish an effective Washington office. There was considerable discussion to the effect that if the council did not do so the support of the conference be extended to either the Western Public Health League or the Lake County people. The general trend probably favored the Western Public Health League because it is a well knit organization with much experience in this type of work.

In concluding this report we would recommend that our delegate to the A.M.A. be instructed to use his influence to further the establishment of an effective Washington office which would adequately serve the interests of the public and ourselves.

W. A. WRIGHT, M.D., *Chairman.*

Maternal and Child Welfare

Your Committee on Maternal and Child Welfare has not found it possible to hold a formal meeting since the, now historic, one of May, 1943, in which it went on record as opposing the regimentation of the medical profession as contained in the E.M.I.C. program of the Children's Bureau. It held then and it holds now to the belief that the interposing of a third party, in this instance the North Dakota State Department of Health, jeopardizes the patient-physician relationship, and that, economically, it represents the entering wedge for a plan of socialization of medical practice.

Leaving the participation or non-participation of the individual physician in North Dakota in the E.M.I.C. program, which is now in effect in North Dakota, for that physician to decide for himself, your committee has concerned itself, by questionnaire, with the very realistic causes for a rising maternal death rate since 1940. We recommend the careful study of the graphic chart, prepared by the North Dakota state department of health and covering the period of nine years which represent the present life-span of your committee on maternal and child welfare. The three major causes of maternal deaths are re-emphasized because of the tremendous importance of infection, toxemia and hemorrhage in causing maternal deaths. It will be noted that, while all three showed a rise between 1940 and 1942, hemorrhage and toxemia continued that rise in 1943 and only infection showed a decline.

Admitting that the war has placed an added burden upon the too few physicians remaining in civilian practice in North Dakota and that there has been an apparent increase in the fulminating type of toxemia of late pregnancy in this younger age group, i. e., hypertensive toxemia, Group B. of the American Committee classification (pre-eclampsia and eclampsia), your committee feels that the following specific recommendations will reduce morbidity and mortality from this group:

1. The insistence upon adequate prepartum care. Visits to the physician every month until the seventh month, every two weeks from the seventh to ninth month, and every week thereafter until delivery. Weight determination, blood pressure readings and urinalysis to be made at every examination. When the blood pressure is 140/90 or over, bedrest and more frequent examinations should be insisted upon.

2. Hospitalization of all cases of toxemia where the symptoms have increased in spite of close supervision and ambulatory regime.

3. The induction of labor by the gentlest possible means when the maximum improvement has been attained and the avoidance of accouchement force to effect delivery. Cesarean section should be limited to strict obstetric indications in toxemia and should only be performed after competent consultation has been obtained.

4. Hypertonic solutions of dextrose in sterile distilled water should be instantly available for intravenous use and plasma or a 6 per cent solution of gum acacia should be as readily accessible for the treatment of shock.

5. Save blood

To reduce the deaths from obstetric hemorrhage, your committee recommends:

1. That all cases of placenta previa be hospitalized.

2. That all maternity homes and hospitals admitting maternity patients keep a blood substitute on hand with intravenous equipment sterile and in good working order, ready for immediate use. We recommend human plasma as the most desirable preparation for emergency use but, where expense or lack of availability make plasma difficult to obtain, we would call attention to the relative cheapness and effectiveness of a 6 per cent solution of gum acacia which is marketed in sterile containers for intravenous use and which is relatively stable. Chief objection to gum acacia is its tendency to form more or less permanent deposits in the liver.

3. That blood counts and hemoglobin determinations be made with sufficient frequency on cases of obstetric hemorrhage to keep the physician informed of the blood reserve of his patient.

4. That operative obstetrics be reduced to a minimum and that all major operative obstetric procedures be preceded by consultation whenever possible.

5. The committee recommends routine use of vitamin K to obstetric patients in labor.

There has been some lessening of neonatal mortality in North Dakota. The individual analysis of infant deaths by questionnaire, which was recommended to the Maternal and Child Hygiene division is beginning to provide some interesting data. Because of limited personnel it has not been possible to follow this study as fully as would have been desirable but we believe it should be continued. Prematurity in North Dakota, as else-

where, continues to be a major problem. Birth shock, birth trauma and hemorrhagic disease of the newborn continue to exact their toll of infant lives. While the incidence of syphilis is low in North Dakota, it is doubly important to keep it low or lower it still further by insisting upon routine Kahn and Kolmer tests on the pregnant woman.

The efficiency and low-toxicity of vitamin K preparations have been determined with sufficient accuracy to warrant the recommendation that they be given routinely to the obstetric patient in labor as prophylaxis against hemorrhagic disease of the newborn.

The recent appearance of diphtheria in the state in several localities and with some fatalities again calls attention to the need for an effective and persistent campaign of immunization against communicable disease in infancy. The private physician can do much to protect his child patients by insisting upon immunization against diphtheria, smallpox and pertussis during the first year of life.

JOHN H. MOORE, M.D., *Chairman.*

Venereal Diseases

Due to travel restrictions and lack of important business to be transacted, no meeting of the committee was held this year. However, the following is a brief report of the venereal situation during the past year.

During the year 1943 physicians reported 311 cases of syphilis to the state health department compared to an average of 375 during the preceding five years. Physicians also reported 263 gonorrhoeal cases compared to a five year average of 405. The decrease in the total number of venereal diseases may be accounted for by the decrease in our population, particularly of youth. The splendid cooperation between the armed forces, the medical profession and state health department in the examination and treatment of contacts of infected servicemen has also undoubtedly contributed greatly to the decrease in the number of new infections.

No changes in the regulations governing venereal diseases have been made during the past year.

JOSEPH SORKNESS, M.D., *Chairman.*

Supplementary Report of Committee on Venereal Diseases

NOTE: The following letter was received by President Frank Darrow too late to be considered by the Committee on Venereal Diseases. It seems worthy of consideration.

"We of the Seventh service command appear to have reached a stalemate in our fight against the venereal diseases. The venereal rates for the army in this area showed steady downward trend until the middle of 1943. Since that time we have at best only held our own. Rates for the first two months of 1944 are actually 50% higher than those of the corresponding months of 1943. It appears, then, that we are faced with the probability of a reversal of the favorable trend of recent years.

I am addressing you as the representative of the medical profession of the state of North Dakota to enlist even greater aid from that important group in our effort to reduce the toll of venereal disease in our ranks. Lest any physician fail to recognize the opportunities for contribution to this end, the following means are submitted for his consideration.

1. Refuse to treat officers or enlisted personnel of the army for venereal disease without the specific approval in each case of the soldier's commanding officer. Army regulations require the soldier to report the existence of symptoms of venereal disease. Failure to do so subjects him to the possibility of disciplinary action. The physician who treats the soldier is thus entering into collusion to circumvent army regulations. Of considerably more practical significance is the fact that the individual undergoing therapy with sulfonamides or arsenicals unknown to his unit officers may be placed in a position to endanger his life and that of his comrades.

2. The physician should support (and lead) community sentiment against prostitution, open or clandestine, with all the weight of his position as a community leader. We would like to ask him to go further—in his public and private contacts to foster the development of those influences in home, school, church, and elsewhere which will strengthen the moral convictions of our youth and confirm them in continent behavior.

3. Support the extension of the community health services; assume leadership in the effort to establish and maintain an adequate preventive medical program for the community. The physician (as guardian of health) bears a heavy responsibility for leadership and direction in these matters.

4. Recognize a grave responsibility in connection with the treatment of civilians with venereal disease; insist upon *continuity of treatment to cure*, using the services of the health officer, when necessary, to insure this. Share with the health officer a sense of responsibility for contact finding. If a busy practice prevents his active participation in this essential phase of the control effort, the physician may call for the assistance of the health department. Of particular concern to us, of course, are the contacts with military personnel, officer and enlisted, that are frequently obtainable by careful questioning.

5. Sad experience has shown us that present methods in the diagnosis and treatment of gonorrhea, especially in the female, leave much to be desired. Findings of positive bacteriologic evidence of gonorrhea *in the absence of symptoms* have been shown to extend in an appreciable percentage of cases beyond the third month of observation. A disturbingly large number of individuals repeatedly named as the probable source of a gonorrheal infection show *no clinical or bacteriological evidence* of the disease. Reports occur with alarming frequency which indicate that women under treatment for gonorrhea have continued to infect soldiers. In the face of these convincing demonstrations of the inadequacies of diagnostic, treatment, and control measures what is our recourse? Several safeguards suggest themselves:

(a) A more cautious attitude on the part of the physician toward the individual under suspicion of gonorrheal infection—in particular, a greater reluctance to accept the *negative* laboratory report or *negative* clinical evidence is indicated.

(b) Improvements in the thoroughness of physical examination including: (1) greater use of laboratory services (darkfield) in the detection of the *Treponema pallidum*; (2) better technic in obtaining specimens for Gram stain or culture in gonorrhea suspects and the recognition of the necessity for repeated examinations; (3) greater use of the consultant and laboratory services of the health department in doubtful cases.

6. Observations on the inadequacy of present methods have implications which the cautious physician will immediately recognize. In particular I should point out:

(a) The medical absurdity inherent in the *certificate* of freedom from venereal disease and the dangers involved in the common practice of giving patients (negative) laboratory reports.

(b) The responsibility which the physician must assume for *attempting to control the sexual activities* of his patient until the probability of continuing infectiousness has been reduced to a minimum. This will necessitate carefully explaining to each patient the nature of his disease and the responsibility to his family and to society which the diagnosis entails. It may necessitate blunt warning to the careless; the invocation of legal measures against the recalcitrant.

(c) The need for larger participation of the private practitioner in the effort to "sell" modern venereal disease *prophylaxis* to the public and especially to his patients.

Yours very sincerely,

H. C. MOORE, Colonel, MC,
Surgeon.

P. S. Dr. Pelouze, assistant professor of urology at the University of Pennsylvania, has recently developed many of these points in an arresting article in the March issue of *Venereal Disease Information*. A consideration of his observations and deductions is recommended to all of our profession who would serve intelligently in this vital phase of the war effort.

Industrial Health

Your committee on Industrial Health did not hold an official meeting during the past year.

We wish to repeat and emphasize the principles of the national program for industrial health, namely: first, to provide adequate medical service within industry, second, to investigate and accurately report occupational disease and injury, and third, to provide instruction to industrial groups concerning the prevention and control of occupational disease.

The sixth annual congress on industrial health conducted in Chicago in February, followed the congress on medical education. A special effort was made to induce the deans of the medical schools and other educators to spend some time at the industrial sessions for the purpose of acquainting themselves with the increasing magnitude and importance of this field of medical service. This attempt, though not highly successful, was deemed worthy of repetition. At any rate, the council on medical education is now inclined to take a more serious view of educational requirements for industrial medicine than formerly, and joint sessions for the discussion of both undergraduate and postgraduate study are in the making.

The suggestion was made that there were not enough discussions of industrial medicine and surgery in our state and district medical meetings.

C. J. GLASPEL, M.D., *Chairman.*

Report of the Delegate to the American Medical Association

Dr. A. P. Nachtwey, delegate, submitted the following report, which was referred to the Committee on Reports of the Council, Councillors and Delegate to the American Medical Association:

Your delegate to the American Medical Association begs leave to submit the following report:

The American Medical Association held its 94th annual session in Chicago, June 7 to 9, 1943.

This meeting was unusual in view of the fact that due to war-time conditions there were no exhibits, no social functions and almost no stimulants.

For the first time the House of Delegates, in the opinion of your delegate, really made history in that it prepared machinery to assume the position of leadership in medical matters for the nation, by creation of a Council on Medical Service and Public Relations, which shall have as part of its functions: (1) "to investigate matters pertaining to the economic, social and similar aspects of medical care for all the people; (2) to study and suggest means for the distribution of medical services to the public consistent with the principles adopted by the House of Delegates; (3) to develop and assist committees on medical service and public relations originating within the constituent associations and component societies of the American Medical Association."

The formation of the new Council sprang from resolutions offered by Indiana, Minnesota, New Jersey, Nebraska, Oklahoma, Ohio, New York and a representative of the section on Radiology, all of which resolutions were referred to a Reference Committee on Legislature and Public Relations of which Dr. Thomas A. McGoldrick of New York was chairman.

A brief abstract of reasons for the establishment of a legislative bureau of the American Medical Association in Washington was as follows:

The number of bills of public health and medical interest being introduced in Congress is sharply increasing. In an analysis of bills of public health and medical interest introduced at the 1943 session of Congress, reference was made to 116 bills. This included such matters as extending privileges to sectarian practitioners, appropriations for constructing hospitals, care of mothers and children, benefits for veterans, social security amendments, and reorganization of the public health service: all of which are of vital interest to the medical profession. The appropriations called for in these various public health bills total \$258,074,000.

The principal objections voiced to a more active participation by the American Medical Association in legislative affairs are:

(1) That it would render the Association liable to a large income tax, and (2) that it would lower the prestige of an association which is organized primarily for scientific purposes."

"The American Medical Association cannot be considered a small business enterprise. We understand that its assets are approximately \$7,000,000. According to the report of the board of trustees the gross income from all sources for the fiscal year ending December 31, 1942, amounted to \$1,975,236.30 and the total expenditures amounted to \$1,644,820.96. This shows that the Association made a profit of \$330,415.34 during the year

1942. There seems to be a moral question involved here. Should the American Medical Association, making such a large profit, escape taxation? As patriotic citizens, should we condone this escape? If the Association voluntarily insisted upon paying an income tax, would not this enhance the prestige of the Association now to be referred to?

As to objection two, the lowering of the prestige of the Association by engaging in legislative activities, our experience in this state negatives this idea. It depends upon how the activity is conducted."

The Council is organized on a very democratic basis, it includes "the president of the American Medical Association, the immediate past-president and the secretary of the Association, one member of the Board of Trustees, and six members of the Association selected on a regional basis."

The Council is (a) to cooperate with the Board of Trustees and (b) will utilize the functions and personnel of the Bureau of Legal Medicine and Legislation, the Bureau of Medical Economics and the Department of Public Relations in the headquarters office of the American Medical Association in Chicago."

Many of the problems of politics and economic interests were discussed, especially the relation of the hospitals to the medical profession. These will require much study and attention for today there is considerable conflict between them.

The supplementary report on "Hospital Corporations Engaging in the Practice of Medicine" by the trustees of the American Medical Association should be read by every hospital man, as the confusion between the profession and the hospitals is increasing.

The address of President Fred W. Rankin of Lexington, Kentucky, was pertinent to the existing war-time conditions and was well received. It would well repay the members of this house of delegates to read the address which is printed in volume 122, number 8, of the *Journal of the American Medical Association*.

The remainder of the transactions of the business of the House of Delegates was carried out in a harmonious manner and as usual, various reference committees performed their respective duties in their usual efficient manner.

Dr. Herman L. Kretschmer of Chicago was named as president-elect of the American Medical Association. He holds a distinguished position in the medical profession and for ten years has been treasurer of the American Medical Association. So he is entirely familiar with the business of the Association.

The House of Delegates adjourned sine die at 12 o'clock, June 9, 1943.

Respectfully submitted,
A. P. NACHTWEY, M.D.,
A.M.A. Delegate.

REPORTS OF SPECIAL COMMITTEES
Committee on War Participation

Dr. L. W. Larson, chairman, submitted the following report, which was referred to the Reference Committee on the Report of the Secretary and Special Committees:

This committee did not meet during the past year. Its individual members assisted the chairman from time to time, however, in his work as state chairman of the Procurement and Assignment Service for Physicians.

North Dakota was not called on during 1943 (and to date) to furnish a quota of medical officers for the armed forces. One physician was allowed to apply for a commission because he insisted on leaving his practice.

The total number of North Dakota physicians in the service at present is 61. Three physicians have been given medical discharges or have resigned. All three have returned to the state.

There is a critical shortage of physicians in several localities in the state. This is mainly in the rural areas and it has been almost impossible to obtain replacements. Some of the areas have rarely had sufficient medical personnel in the prewar days. The citizens get along as best they can by traveling, sometimes for long distances, to a physician. Several of these localities are planning to avail themselves of the benefits included in Public Law 216, whereby the United States public health service and the community cooperate in obtaining a physician and defray-

ing his moving expenses and a three months allowance of \$250.00 a month. The local community pays 25 per cent of the total cost. The physician must be licensed to practice in the state and must agree to practice in the new location for one year.

Postwar Problems: Table 1 indicates the number of so-called "effectives" in practice in North Dakota. The total number of physicians is 373, of which 53 are not in active practice (retired, disabled, senile, teachers, public health, state hospitals). This leaves a total of 320 who are actively engaged in the private practice of medicine. Table 2 shows the age distribution of the practitioners. It will be noted that about a third are under 45, and two-thirds are over 45 years of age. Of the latter two-thirds, however, a half are 65 or over and although many of them are very active, the majority must of necessity curtail their activities.

TABLE 1

Analysis of Medical Personnel in North Dakota

Physicians in active practice (all ages)	320
Non-effectives (age, disability, etc.)	33
Medical-school teachers	2
Physicians in state hospitals and institutions	13
Physicians in health departments	5
Total physicians in state	373

TABLE 2

Analysis of Practitioners in North Dakota

Age Groups	Total No.	Percentage
Under 38 years	46	14.4
38 to 45	65	20.3
45 to 65	138	43.1
65 and over	69	21.6
Females	2	.6
Total	320	100.0

The present population in North Dakota is estimated as being 16 per cent less than in 1940, or about 538,000. The physician-population ratio at present, therefore, is one to 1680. This is not much greater than the ratio agreed upon by the Procurement and Assignment Service as being favorable for a general practitioner. An analysis of the situation in North Dakota reveals, however, that an unusually large proportion of our effective physicians are limited specialists. In addition, the distribution of physicians in North Dakota is not favorable to the rural districts, three counties having no physician at all, and in most the ratio is one physician to 3000 people or over.

The postwar problem of absorbing the returning physician-veteran in North Dakota will be simple, provided the majority are willing to locate in rural areas. It is a serious question whether the average physician-veteran will be content to locate in a small town with limited or no hospital facilities. There is much talk these days of expanding hospital facilities in the rural areas, but our planners would do well to consider the problem of obtaining trained medical personnel for these areas who will be content to remain there. Several communities in this state learned, during the depression days, that it takes more than a hospital building to hold a qualified physician. It would appear more sensible to enlarge present facilities and provide all-year surfaced roads and ambulances so patients from the sparsely settled areas can be transported to centers, large or small, where hospital facilities and medical personnel are available and adequate.

The committee will continue to cooperate with the Procurement and Assignment Service in furnishing medical officers for the armed forces and in assuring the civilian population of the state the most effective medical service possible under existing circumstances.

L. W. LARSON, M.D., *Chairman.*

NEW BUSINESS

Dues

After thorough discussion and for want of a motion to change the annual dues, the speaker announced that the dues will remain the same as last year.

Nominating Committee

The Secretary announced that President Darrow had appointed the following to the nominating committee: Doctors G. M. Constans, chairman, Bismarck; F. E. Wolfe, Oakes; John C. Fawcett, Devils Lake.

RESOLUTIONS

1. Dr. A. P. Nachtwey presented the following resolution in behalf of the Southwestern district medical society. After its reading, it was referred to the Committee on Resolutions by the Speaker.

RESOLUTION

Whereas, Congress, recognizing the need for assisting financially the wives of soldiers in connection with maternity and infant care, appropriated in March, 1943, \$1,200,000.00 for such purpose and in October, 1943, made an additional grant of \$18,600,000.00 for this purpose, and specifically stated that the plans for administering this aid were to be developed and administered by the state health agencies,

(It further developed that this grant of Congress was given to the Department of Labor, who in turn developed a "master plan," and the representatives of the Children's Bureau of the labor department came to the authorities of our state and were told that this plan must be accepted.)

And Whereas, the Emergency Maternal and Infant Care Program as presented by the United States Department of Labor through the North Dakota state department of health discriminates against the rural practitioner who has inadequate hospital facilities;

Whereas, the funds as allotted by the Emergency Maternal and Infant Care Program are not sufficient to provide adequate hospital care, and

Whereas, the Emergency Maternal and Infant Care Program, as now presented, interposes a third party in the form of the state department of health as intermediary in making the financial arrangements between patient and doctor;

Whereas, the Emergency Maternal and Infant Care Program, as presented, tends to dictate or establish fees and medical procedure;

Whereas, the provisions for the carrying on of such a program as now in operation expire June 30, 1944;

Be It Therefore Resolved, that the Emergency Maternal and Infant Care Program as presented be rejected in its entirety;

Be It Further Resolved, that any plan presented shall not be accepted by any individual doctor or local society until approved by the state medical society;

Be It Further Resolved, that the state medical society present to the appropriate committees of Congress a workable plan whereby the best interests of the wives and infants of men in service be served during the present emergency;

Be It Further Resolved, that this society make the following recommendations:

First, the money allotted for maternal and pediatric care be paid directly to the mother as are the present allotments for care of mother and dependents; and let it be further recommended that the mother be allowed to make all financial arrangements between herself and her doctor;

Second, that information concerning the proposed plan be released by the state department of health to the doctors prior to any notification of either the mothers participating or the public.

H. E. GULOIEN, M.D., *Chairman.*

H. L. REICHERT, M.D., *Secretary.*

2. The Speaker referred the resolution concerning the Maternal and Infant Care Program as contained in the Secretary's report, to the Committee on Resolutions.

3. Dr. Fjelde announced that the Cass County district society desired to present a resolution concerning prepaid medical insurance plans, with special reference to the relationship of such plans to the Blue Cross hospital plan. The Speaker directed Dr. Fjelde to present a formal resolution to the Committee on Resolutions for consideration.

4. The Speaker referred the last paragraph in the report of the Committee on Medical Economics, pertaining to its recom-

mendation that our delegate to the American Medical Association be instructed to use his influence to further the establishment of an effective Washington office which would adequately serve the interests of the people and ourselves, to the Committee on Resolutions, with the instructions that this committee present a formal resolution in its report at the next session of the House of Delegates.

Reference Committees

The Speaker announced the personnel of the reference committees as follows:

To consider the reports of the Secretary and of Special Committees: D. J. Halliday, chairman, Kenmare; M. J. Moore, New Rockford; P. H. Woutat, Grand Forks.

To consider the reports of the Council, Councillors and Delegate to the A.M.A.: A. H. Reiswig, chairman, Wahpeton; J. H. Fjelde, Fargo; R. H. Waldschmidt, Bismarck; A. W. MacDonald, Valley City.

To consider the reports of the Standing Committees: E. H. Boerth, chairman, Buffalo; G. M. Constans, Bismarck; John C. Fawcett, Devils Lake; C. C. Smith, Mandan; A. P. Nachtwey, Dickinson.

Committee on Resolutions: R. C. Little, chairman, Mayville; W. A. Wright, Williston; W. W. Wood, Jamestown.

Committee on Credentials: R. W. Van Houten, chairman, Oakes; W. E. G. Lancaster, Fargo; C. J. Glaspel, Grafton; R. T. O'Neill, Minot.

Adjournment

The first meeting of the House of Delegates was adjourned at 9:10 P. M. on motion made by Dr. Boerth, seconded by Dr. Constans and carried. It was agreed that the Second Session of the House would be called at 10:00 A. M., Monday, May 8.

SECOND SESSION

of the HOUSE OF DELEGATES

Monday, May 8, 1944

The second session of the House of Delegates was called to order by the Speaker, Dr. John H. Moore, at 10:15 A. M. in the South Room, Gardner Hotel, Fargo, N. Dak.

The Secretary called the roll. Eighteen delegates responded, and the Speaker declared a quorum present. The following delegates and alternates responded: Doctors W. E. G. Lancaster, Fargo; E. H. Boerth, Buffalo; John C. Fawcett, Devils Lake; C. J. Glaspel, Grafton; P. H. Woutat, Grand Forks; W. A. Liebeler, Grand Forks; W. A. Wright, Williston; D. J. Halliday, Kenmare; A. H. Reiswig, Wahpeton; A. W. MacDonald, Valley City; G. M. Constans, Bismarck; C. C. Smith, Mandan; R. H. Waldschmidt, Bismarck; R. W. Van Houten, Oakes; A. P. Nachtwey, Dickinson; W. W. Wood, Jamestown; R. C. Little, Mayville; and M. J. Moore, New Rockford.

The Secretary read the minutes of the first session, which were approved as read.

Introduction of Distinguished Guests

Dr. Nachtwey introduced Dr. E. H. Skinner of Kansas City, Missouri, member of the board of trustees of the National Physicians Committee and delegate from the section on Radiology in the House of Delegates of the American Medical Association. Dr. Skinner reviewed the activities of the American Medical Association as they pertain to medical economics.

The Speaker introduced Dr. W. W. Bauer, secretary of the Bureau of Health Education of the American Medical Association. Dr. Bauer gave an interesting report of the subcommittee hearing which he attended recently in Washington on the Emergency Maternal and Infant Care Program, and at which he presented the point of view of the American Medical Association.

Election of Officers

Dr. G. M. Constans, chairman of the nominating committee, presented the following report and moved its adoption. The motion was seconded by Dr. Fjelde, and carried unanimously.

Doctors: F. L. Wicks—president.
James F. Hanna—president-elect.
A. E. Spear—first vice president.
P. G. Arzt—second vice president.
John H. Moore—speaker.
L. W. Larson—secretary.
W. W. Wood—treasurer.

A. P. Nachtwey—delegate to A.M.A., 1944.
 W. A. Wright—alternate delegate to A.M.A., 1944.
 P. H. Burton—councillor, first district.
 C. J. Gaspel, councillor, third district.
 N. O. Ramstad, councillor, sixth district.

In addition, in place of Doctor Arzt who, we understand, would not now be eligible, Dr. Joseph Sorkness— councillor, seventh district.

State board of medical examiners (term three years): Doctors C. W. Schoregge, C. J. Gaspel, F. L. Wicks.

Your committee would like to present the following recommendation: that future nominating committees be appointed by the incoming president at the onset of his term of office.

F. E. WOLFE, M.D.
 G. M. CONSTANS, M.D.
 J. C. FAWCETT, M.D.

The Speaker, by unanimous consent, ruled that the portion of the nominating committee's report pertaining to the appointment of subsequent nominating committees by the incoming presidents at the onset of their terms of office be reconsidered under new business.

Selection of 1945 Meeting Place

The Secretary announced that no formal invitations had been received. Upon motion made by Dr. Waldschmidt, seconded by Dr. Reiswig and carried, Minot was selected for the 1945 convention.

Reference Committee on Reports of Secretary and Special Committees

Dr. D. J. Halliday, chairman, presented the following report which was adopted section by section and as a whole:

We particularly wish to call the attention of the House of Delegates to two recommendations as submitted by the Secretary:

1. That the Committee on Public Policy and Legislation be authorized to submit a printed questionnaire on questions of medical economics to all candidates for nomination to congressional offices this year, and that photostatic copies of the answers be sent to the members of the Association.

2. That the Council be requested to allot \$50.00 per year to the North Central medical conference.

We wish also to commend the Secretary for his untiring and excellent work during the past year.

We also recommend the adoption of the report as submitted by the Committee on War Participation, and wish to commend the committee for its work. We are sure it will continue to handle this difficult problem with efficiency.

We are sorry to call the attention of the delegates to the fact that the Committee on Nursing Education failed to submit a report. Your Reference Committee moves the adoption of the report as a whole.

D. J. HALLIDAY, M.D.
 P. H. WOUTAT, M.D.
 M. J. MOORE, M.D.

Reference Committee on Reports of the Council, Councillors, and Delegate to the A.M.A.

Dr. Reiswig, chairman, presented the following report, which was adopted section by section and as a whole on motion of Dr. Reiswig, duly seconded and carried:

1. Report of the chairman of the Council: Your Reference Committee has carefully considered the report of the Council as submitted by its chairman, Dr. N. O. Ramstad. This committee finds the affairs of the state association have been efficiently administered by the Council.

2. Reports of the Councillors: Your Reference Committee recommends the adoption of the reports of the councillors and we are pleased to note that all the councillors report harmony and good-will prevailing in all districts.

The committee has noted that in District 8, there were no meetings held at all. Your committee would recommend that an earnest effort be made so that at least a few meetings be held during the year.

Your committee has noted the suggestion of the councillor from the Third district in which a return to the former plan of organization of the House of Delegates in which council mem-

bers participated be urged. Your committee believes that the present plan of organization of the House of Delegates should be continued.

The committee notes that an individual is practicing medicine in the Fifth district at Dazey, N. D., without a license. This, in spite of repeated requests of the Fifth district of our Association to the state board of medical examiners to effect his removal. This committee would like to urge that active steps be taken to effect his removal. Your Reference Committee believes that the reports of the councillors indicate that all the district societies are well organized and that enthusiasm is being maintained.

3. Report of the Delegate to the American Medical Association: Your Reference Committee recommends the adoption of this report and believes that Doctor Nachtwey is to be commended on his very fine report as delegate to the A.M.A.

A. H. REISWIG, M.D.
 J. H. FJELDE, M.D.
 R. H. WALDSCHMIDT, M.D.
 A. W. MACDONALD, M.D.

Report of Reference Committee to Consider the Reports of Standing Committees

Dr. E. H. Boerth, chairman, presented the following report, which was adopted section by section and as a whole on motions of Dr. Boerth, duly seconded and carried, after discussion:

1. Committee on Cancer. We recommend the adoption of the report of the Committee on Cancer. The committee regrets that there has been no meeting of the Committee on Cancer during the past year but we wish to commend Doctor Larson, the chairman, for his remarks and the splendid report he brought in, in view of the fact that there had been no meeting. We also concur in the remarks made in the last paragraph of the report that the component medical societies are urged to devote at least one program a year to the early diagnosis and treatment of cancer.

2. Committee on Pneumonia Control. Your Reference Committee recommends the adoption of the report of the Committee on Pneumonia Control and at this time also wishes to express appreciation to the members of the committee who gave so freely of their time to meet with the members of the state department of health. The report of this committee shows that they had the best interests of the medical profession of the state at heart.

3. Committee on Industrial Health. Your Reference Committee recommends the adoption of the report of the Committee on Industrial Health. The members of the committee heartily approve of the suggestion made in the last paragraph of the report which states that there were not enough discussions of industrial medicine and surgery in our state and district medical meetings, and urges that meetings be held, especially in the larger district medical societies.

4. Committee on Necrology and Medical History. Your Reference Committee recommends the adoption of the report of the Committee on Necrology and Medical History and wishes at this time to pay special commendation to the members of the committee for their excellent presentation. The committee regrets that such a lengthy report was necessary because so many of the society members passed away during the preceding year. The committee requests that the Speaker of the House of Delegates ask the members of the House of Delegates to stand for a period of one minute in silent tribute to these members who are no longer with us. (Members of the House of Delegates stood one minute in silent tribute.)

5. Committee on Maternal and Child Welfare. Your Reference Committee recommends the adoption of the report of the Committee on Maternal and Child Welfare. The second paragraph of this report on page 34, is being covered in another committee. The inclusiveness of the report shows careful preparation by this committee and your Reference Committee urges that special attention be paid to the recommendations for reducing morbidity and mortality as recommended by the American Committee classification.

6. Committee on Public Health. Your Reference Committee recommends the adoption of the report of the Committee on Public Health with the exception of paragraph two in reference

to Senate Bill No. 77, providing permissive legislation for providing full-time health districts. Your Committee does not feel that it wishes to reconsider the action taken at the Fifty-sixth annual session.

7. Committee on Medical Economics. Your Reference Committee recommends the adoption of the report of the Committee on Medical Economics with the following exception:

It has come to the attention of the members of your Reference Committee that some inequities exist in the public welfare board fee schedule as mentioned in Item 2, paragraph 1, of the report. We recommend a revision of this fee schedule.

Your Reference Committee has not considered the last paragraph of the report recommending that our delegate to the American Medical Association be instructed to use his influence to further the establishment of an effective Washington office, since this is embodied in a resolution to be recommended before the House of Delegates.

We wish to commend the members of this committee for the untiring efforts and zeal they have displayed on behalf of the medical profession of the state of North Dakota.

8. Committee on Medical Education. Your Reference Committee recommends the adoption of the report of the Committee on Medical Education and wishes to extend to Doctor French and the members of his committee the compliments of your Reference Committee, fully realizing the difficulties which he is laboring under during war time.

9. Committee on Fractures. Your Reference Committee recommends the adoption of the report of the Committee on Fractures.

10. Committee on Crippled Children. Your Reference Committee recommends the adoption of the report of the Committee on Crippled Children.

11. Committee on Venereal Disease. Your Reference Committee recommends the adoption of the report of the Committee on Venereal Disease.

12. Committee on Public Policy and Legislation. Your Reference Committee recommends the adoption of the report of the Committee on Public Policy and Legislation, and concurs wholeheartedly in the recommendation of the committee that there should be a full and general discussion before this House of Delegates regarding the status of refugee physicians. Your Reference Committee does not recommend that refugee physicians be admitted into this state to practice medicine and surgery until they are citizens of the United States.

Report of Committee on Resolutions

Dr. R. C. Little, chairman, presented the following report which was adopted section by section and as a whole, on motions of Doctor Little, duly seconded and carried:

1. *Emergency Maternal and Infant Care Program.* Two resolutions have been presented covering this subject; one by the Secretary as printed in the handbook and the other by Dr. A. P. Nachtwey in behalf of the Southwest district medical society. Your Committee believes that inasmuch as the House of Delegates and the Council passed resolutions defining its policy with relation to the Emergency Maternal and Infant Care Program in 1943, and there is no apparent need for a change in this policy at the present time, the resolution submitted by Dr. A. P. Nachtwey be rejected and the resolution by the Secretary be adopted. This resolution is as follows:

RESOLUTION

Whereas, the program now in operation for maternal and infant care for wives and infants of enlisted men in the four lower grades is unsatisfactory to the medical profession, and,

Whereas, the emergency provisions for the carrying on of the program as now in operation expire June 30, 1944, be it therefore,

Resolved, that the House of Delegates of the North Dakota State Medical Association recommends that Congress abandon the program as now constituted on that date, and be it further

Resolved, that under any new program after June 30, 1944, the benefits be designated supplemental aid and take the form of an allotment for medical, hospital, maternity and infant care, similar to the allotments already provided for the maintenance of dependents, leaving the actual arrangements with respect to fees to be fixed by mutual agreement between the enlisted man's wife and the physician of her choice, and be it further

Resolved, that the American Medical Association be urged to present to the appropriate committees of Congress a concrete plan embodying this principle, to the end that the present and ultimate best interests of the wives and infants of men in service be served during the present emergency.

2. *Prepaid Medical Insurance Plans.* The resolution presented by the Cass County medical society is as follows:

RESOLUTION

Be It Resolved, that due to public pressure regarding prepaid medical plans, a committee be appointed to study the various angles and present a report at the next meeting.

And Be It Further Resolved, that such a plan be administered in conjunction with Blue Cross, but under the control of a committee with adequate medical representation.

O. A. SEDLAK, M.D.

W. E. G. LANCASTER, M.D.

Your Committee on Resolutions desires to draw to your attention the report of the Committee on Medical Economics in 1942 and a further report in 1944 concerning prepaid medical insurance plans. These reports indicate that the Association through its Committee on Medical Economics has maintained an interest in the subject and your Committee does not feel that the resolution presented by the Cass County medical society is necessary. We recommend that the Committee on Medical Economics be instructed to continue its study of such plans and that separate committees for such studies be not authorized at this time.

3. *Postwar Planning for Health.* In view of the fact that various governmental agencies and lay organizations are concerning themselves with postwar planning for health it is the opinion of your Committee on Resolutions that the North Dakota state medical association, through its properly appointed representatives, should be represented in such conferences whenever and wherever possible.

4. *Federal Medical Legislation.* Your Committee on Resolutions wishes to present the following resolution:

RESOLUTION

Whereas, in the judgment of the House of Delegates of the North Dakota state medical association, there is urgent need for the proper representation of the medical profession in Washington, and,

Whereas, it is only proper that the American Medical Association should function in this respect because it does and must speak for the medical profession in the United States, now therefore,

Be It Resolved, that the House of Delegates of the American Medical Association be urged to establish adequate representation in Washington at once, so that members of the Congress may readily have available authoritative information on medical matters and the views of the medical profession may be imparted to members of Congress.

5. *Resolution Honoring Dr. George M. Williamson.* Your Committee wishes to present the following resolution:

RESOLUTION

Whereas, Dr. George M. Williamson, at his own request, has retired from the Council of the North Dakota State Medical Association, and

Whereas, Doctor Williamson has given unsparingly of his time and effort as president of the Association and as a member of the council for many years,

Now, Therefore, Be It Resolved, that the House of Delegates extends to him its gratitude for the service he has rendered, and expresses its hope that he will continue to manifest an interest in the affairs of the Association.

6. *Vote of Thanks to Cass County Medical Society.* Your Committee on Resolutions wishes to extend a vote of thanks to the Cass County medical society and the committee members on local arrangements for the splendid program which has been arranged, the facilities which have been placed at the disposal of the Association, and the entertainment furnished.

NEW BUSINESS

Nominating Committee—When Appointed

Dr. Constans reintroduced the recommendation of the nominating committee, "that future nominating committees be ap-

pointed by the incoming president at the onset of his term of office." The motion was seconded by Dr. Nachtwey and carried unanimously after discussion.

Election to Honorary Membership

Dr. J. E. Countryman, formerly of Grafton, was elected to honorary membership after motion made by Dr. Glaspel, seconded by Dr. Frank Darrow and carried.

Venereal Disease Problem

A motion was made by Dr. Halliday, seconded by Dr. Waldschmidt and carried, that the Secretary include a copy of the letter on venereal disease which was received from the Seventh service command medical headquarters in Omaha and printed in the handbook as a supplementary report of the Committee on Venereal Disease, in the next news bulletin to be sent to the membership from the Secretary's office.

Adjournment

The House of Delegates adjourned sine die at 12:30 P. M.

SCIENTIFIC PROGRAM

General Sessions, Elks' Auditorium

Monday, May 8, 1944

2:00 P. M.—Address of Welcome—Dr. Frank Darrow, Fargo, President, North Dakota State Medical Association.

2:10—Library of Bureau of Health Education—Dr. W. W. Bauer, Chicago, Illinois, Director Bureau of Health Education, The American Medical Association.

2:50—"Sterility"—Dr. Charles M. McLane, New York City. Attending Staff, Obstetrics and Gynecology, The New York Hospital; Instructor, Cornell University Medical College, New York.

3:30—Recess to view exhibits.

3:45—"Navigating the Medical Future"—Dr. Edward Holman Skinner, Kansas City, Missouri, Executive Committeeman of the National Physicians Committee for the Extension of Medical Service; Past-president the American Roentgen Ray Society.

4:30—"Urinary Tract Infections in Childhood"—Dr. Henry F. Helmholtz, Rochester, Minnesota, Professor of Pediatrics The University of Minnesota Graduate School of Medicine, The Mayo Foundation.

Tuesday, May 9, 1944

9:00 A. M.—"Trusurethral Surgery"—Dr. N. O. Brink, Bismarck, N. D.

9:30—"The Symptom of Headache"—Dr. Lawrence R. Boies, Minneapolis, Minnesota, Professor of Otolaryngology University of Minnesota Medical School.

10:20—Recess to view exhibits.

10:40—"Cardiac Irregularities"—Dr. R. O. Goehl, Grand Forks, N. D.

11:10—"Common Disorders of the Skin"—Dr. Henry E. Mickelson, Minneapolis, Minnesota, Professor of Dermatology and Syphilology and Director of Division of Dermatology The University of Minnesota Medical School.

2:00—Presidential Address—Dr. Frank I. Darrow, Fargo.

2:30—"Indications for the Surgical Treatment of Peptic Ulcer"—Dr. Carl G. Morlock, The Mayo Clinic, Rochester, Minnesota.

3:20—"Observations on Tropical Diseases"—Lt. J. A. Homes, M.C., U.S.N.R., F.A.C.S.

4:00—Closing. Announcements.

INSTALLATION OF PRESIDENT

Tuesday, May 9, 1944, 2:15 P. M.

Dr. FRANK DARROW: At this time it is my privilege to ask Dr. Williamson and Dr. Burton to usher up your newly elected president, Dr. F. L. Wicks.

Dr. P. H. BURTON: Dr. Wicks, our president-elect.

Dr. DARROW: I think this is the appropriate time to express my thanks to everybody from the officers on down to the members and back again up to the officers, never forgetting in the middle of this, Doctor Larson, our chief worker, whom I must give special mention to. I now turn over to Dr. Wicks this gang of—well you can read about them in your newspapers and find out what they really amount to—and treat them accordingly.

Dr. F. L. WICKS: Thank you, Doctor Darrow. Let me be the first to congratulate you on your most successful administration. Members of the Association: First I want to thank my friends, Doctors Burton and Williamson, for helping me to the platform. I think I could use their services a lot longer. In accepting the gavel from Dr. Darrow, I recognize this as one of the highest honors that could come to me. I am deeply grateful and thank you. I will endeavor to merit your trust and confidence in me. It is with a sincere feeling of humility that I start the duties of the year, to try to emulate in a manner the activities of the past presidents. I trust that the fine feeling and cooperation that have prevailed may prevail in the future. I feel, too, that the other officers, the House of Delegates, Councillors, and the committees at large all share in the administration of the Association. It is to be remembered that each doctor represents the profession to a large number of the laity. Now, I pledge my best efforts and ask your cooperation. I thank you.

PRESIDENTIAL ADDRESS*

Dr. Frank Darrow

Fargo, North Dakota

Members of the North Dakota State Medical Association and Guests:

Another year has rolled around and a busy one for all of us. It becomes my privilege to give an accounting of my stewardship and perhaps some observations about our place in the order of things.

There are in North Dakota three hundred and forty practicing physicians. Divided into a population of six hundred and fifty thousand, we find one doctor to approximately nineteen hundred persons. Sixty-three are serving our country as members of the armed forces, sixty of whom are members of this association. Approximately twenty per cent of North Dakota's doctors have gone to war. Ten members of our association have died

*Presented before the North Dakota State Medical Association, Tuesday, May 9, 1944.

during the past year. Five doctors have come into the state to practice medicine.

North Dakota has met all quotas assigned to it by the Office of Procurement and Assignment completely and promptly. This can only mean that medical men have responded to their nation's call in a manner that gives us reason to be a little proud. We are apt to think our efforts go unnoticed.

In a recent nation-wide broadcast by Cedric Foster from Boston, the medical profession was eulogized in no uncertain terms. It was pleasant to listen—and indicated that there is a real appreciation by thoughtful people. He also paid high tribute to you on the home front, and pointed out the many sacrifices made necessary by the lack of doctors at home. I think I can safely say that

our conduct in deeds, and, when necessary, sacrifices, in doing the job, will play a large part in deciding what type of medicine will be practiced in the future. It will be our performance rather than any arguments our spokesmen may make that will determine public opinion. Let us place our faith in good works. Good will flows toward those who manage their own affairs successfully.

In turn may we be ever mindful of the still greater sacrifices made by those who are in the armed forces. We should be the first to sing their praises and make their homecoming adjustments easy and pleasant. If situations arise where preference is to be shown, let us be the first to see that such preference is given to those returning from the war. In this way the great tradition of medical ethics will write another chapter to point to with pride. This will solidify our ranks as no other action can do.

Politically and from the standpoint of the voting franchise, we are an insignificant minority. Although our numbers are small—as yet there is no alternate nor substitute for medical care. Perhaps our greatest untried strength lies in this fact. Let us endeavor, however, never to find it necessary to use this strength as a weapon for our own ends.

We are met here in an association of professional men and women to learn from each other. Our purposes are lofty and unselfish as defined by our first constitutional provision. Just as this state-wide association is made up from county and district societies, so is our larger unit, the American Medical Association, made up from the various state organizations. I mention this to remind you of the completely fair and democratic nature of our organization. We cannot conceive of a better manner of organization. No one is denied a hearing. During this year I was told by a government official that his bureau could not confer with the medical profession as a whole as they had no one who truly represented them. He said "The American Medical Association did not represent the medical profession and that each doctor had a different opinion." A powerful organization in our own state editorialized that a clique of organized medicine was disgracing the State of North Dakota. I speak of this in order that you may know that your elected representatives have been questioned as to their authority to speak for you on questions that involve the opinions of medical men as a whole. I suggest that public policy be freely and thoroughly discussed in your local societies to the end that the representatives you do elect will be in fact representative. Minority opinion will always exist in an organization such as ours but let it express itself in open meeting first so that your associates may have the benefit of such opinion. There is little evidence of any great discord in our ranks but such as will be voiced you can be sure will be magnified, and very probably distorted by those opposed to our purposes.

We are passing through a period in the history of man when we may safely say that the world is sick. Everywhere the men of nations are pitted in conflict vying in methods of killing each other and destroying cities, homes and the means of livelihood and life itself. It is

no wonder that some attention has been directed towards the practice of medicine which is the outstanding profession devoted to methods of protecting, preserving and saving life. We are the target of myriads of tracts, for the most part critical, of our inability to make available to all those benefits we dispense.

Formerly these criticisms generally came under one of three headings:

1. "The high cost of medical care." *
2. Large groups of the people do not receive adequate medical care.
3. The great difficulty of catastrophic illness.

Today social security has become the political catch phrase. Utopian schemes have once more become the popular theme. Promises are made and analogies drawn that suggest the millennium is just around the corner if we will only revolutionize our antiquated methods. As physicians, we are especially interested, inasmuch as our profession is one of the most prominent parts of these schemes. Also as physicians we have learned to believe in evolution and progress, not revolution and destruction.

There have been enumerated over 60,000 postwar planning bodies in the United States alone. Many, if not a majority, of the more comprehensive plans contain a scheme for the socialization of medicine. These plans demand the rights and benefits of each special group that puts them forward but no mention is made of personal responsibility on the part of citizens so paternalized and pampered. The planning bodies are so numerous and the babble of voices so confusing, probably most of the plans will fall from sheer weight of numbers. Our special interest lies in the inclusion of socialized medicine in their blueprints.

Let us remember the trend of social and political organization is toward federalization and away from local control. Responsibility is being centralized and with it authority and power. We are now in this war, I take it, to prevent those in authority and power in two nations from taking over the whole world and ruling it by such central power and authority. If history teaches us anything we must certainly know that tyranny, not the millennium, is just around the corner, in the event of completely centralized power. Because of this threat there is a tendency to take two opposing views, each going all the way out, either to complete socialization on the one hand or reactionary stagnation on the other.

It is the purpose of this message to point out that now is the time for every practitioner of a healing art to consider well the problem. Let each medical man from those in high places down to the most humble practitioner put his mind to these problems and it is likely that his contribution will be an important factor in the final decision.

No doubt you are aware much has been done already by the medical profession. Experimental groups of prepaid medical care are now functioning in California, Colorado, Delaware, Massachusetts, Michigan, Missouri, New Jersey, New York, (3) North Carolina (2) Oregon, Pennsylvania, Texas, Utah, and Washington. Programs which are not entirely completed have been undertaken in Connecticut, Indiana, Maine, Nebraska,

New Hampshire, Ohio, Oklahoma, Tennessee, West Virginia, and Wisconsin. The number of subscribers to these organizations varies from a few thousand to 600,455 enrolled in the Michigan Medical Service.

The medical profession has been accustomed to change and progress with the possible exception of a 1500 years period in the middle ages when reverence for authority stifled progress. In modern times where the practice is sound and based on proved scientific facts, the acceptance of a new method or remedy is almost instantaneous and universal. The danger lies in the fact that so often the medical profession seems to be alone in recognizing the danger of taking over new ideas just because of great promises. We have been criticized on numerous occasions by the public because we were not moved by the promises of charlatan or enthusiast. In this connection we think of instances like the famous Turtle serum for tuberculosis and the Coffee Humber cancer cure. So it is with social charlatans and enthusiasts; let us look well into their promises and schemes.

There has been introduced into the lawmaking body of this country a bill, Senate Bill No. 1161, commonly known as the Wagner-Murray-Dingle bill. It is not my

intention to discuss in detail this measure. It is a comprehensive plan which among other things includes socialized medicine. I mention it to call it to your attention and suggest that everyone within reach of my voice read and analyze it for himself. Your neighbors have a right to expect you to know all about it and its implications. I can safely say it will be far-reaching in its effects and whether it becomes a law or not will depend in no small part on public opinion of which you are a part. When you have considered it well, become vocal, tell your representatives and senators your opinion, call the attention of your friends and neighbors to it. Discuss it with them.

Perhaps it is well in these times that we occasionally pause in our scientific discussions and deliberate on our place in society as a whole. We might imagine ourselves on the receiving end of medical practice once in a while. It may develop our sense of values. Nothing is ever quite as important or unimportant as we think it is.

In the words of the Bard of Ayrshire:

"O wad some gift the giftie gie us

To see oursels as others see us!

It wad frae monie a blunder free us."

NORTH DAKOTA STATE MEDICAL ASSOCIATION ROSTER -- 1944

MEMBERSHIP BY DISTRICTS CASS COUNTY MEDICAL SOCIETY

PRESIDENT	
J. H. Fjelde	Fargo
SECRETARY-TREASURER	
L. A. Nash	Fargo
Bachelor, S. C.	Enderlin
Baillie, W. F.	Fargo
Boerth, E. H.	Buffalo
Bond, J. H.	Fargo
Borland, V. G.	Fargo
Burt, A. C.	Fargo
Burton, Paul H.	Fargo
Clay, A. J.	Fargo
Clark, I. D., Jr.	Casselton
Darner, C. B.	Fargo
Darrow, Frank I.	Fargo
Darrow, Kent E.	Fargo
DeCesare, F. A.	Fargo
Dillard, J. R.	Fargo
Elofson, Carl E.	Fargo
Fjelde, J. H.	Fargo
Fortin, H. J.	Fargo
Fortney, A. C.	Fargo
Foster, G. C.	Fargo

Geib, M. J.	Fargo
Gronvold, F. O.	Fargo
Hanna, J. F.	Fargo
Haugen, H.	Fargo
Haugrud, E. M.	Fargo
Hawn, Hugh W.	Fargo
Heilman, Charles O.	Fargo
Hendrickson, G.	Enderlin
Huntley, H. B.	Kindred
Hunter, G. Wilson	Fargo
Ivers, G. W.	Fargo
Joistad, A. H.	Fargo
Kaess, A. J.	Fargo
Klein, A. L.	Fargo
Lancaster, W. E. G.	Fargo
Larson, G. A.	Fargo
Lewis, T. H.	Fargo
Limburg, A. M.	Fargo
Long, W. H.	Fargo
Mazur, B. A.	Fargo
Miller, H. W.	Casselton
Morris, Arthur C.	Fargo
Nash, Leo A.	Fargo

Nichols, Arthur A.	Fargo
Nichols, Wm. C.	Fargo
Oftedal, Axel	Fargo
Oftedal, Trygve	Fargo
Ostfield, J. R.	Fargo
Patterson, T. C.	Lisbon
Pray, L. G.	Fargo
Richter, E. H.	Hunter
Rostel, Hugo	Fargo
Sand, Olaf	Fargo
Schatz, George	Fargo
Sedlak, Oliver A.	Fargo
Sinner, B. L.	Fargo
Skelsey, Albert W.	Fargo
Stafne, Wm. A.	Fargo
Stolinsky, A.	Boise, Idaho
Swanson, J. C.	Fargo
Tainter, Rolfe	Fargo
Tronnes, Nels	Fargo
Urenn, B. M.	Fargo
Watson, E. M.	Fargo
Weible, Ralph D.	Fargo
Winn, W. R.	Fargo

DEVILS LAKE DISTRICT MEDICAL SOCIETY

PRESIDENT	
John D. Graham	Devils Lake
SECRETARY-TREASURER	
John C. Fawcett	Devils Lake
Call, A. M.	Rugby
Clayman, Sidney G.	San Haven
Drew, G. F.	Devils Lake
Engesather, J. A. D.	Brocket
Fawcett, D. W.	Devils Lake
Fawcett, J. C.	Devils Lake

Fawcett, N. W.	Devils Lake
Fox, W. R.	Rugby
Graham, J. D.	Devils Lake
Greengard, M.	Rolla
Horsman, A. T.	Devils Lake
Hughes, Bernard J.	Rolla
Keller, E. T.	Rugby
Kohlmeyer, F. C.	Lakota
Mattson, Roger H.	McVile
McDonald, J. A.	Cando

McIntosh, G. J.	Devils Lake
McKeague, D. H.	Maddock
Palmer, Dolson	Cando
Reed, Paul	Rolette
Serhus, L. N.	Rolette
Sihler, W. F.	Devils Lake
Smith, Clinton	Devils Lake
Stickelberger, J. S.	Oberon
Toomey, G. W.	Devils Lake
Vigeland, J. G.	Brinsmade

GRAND FORKS DISTRICT MEDICAL SOCIETY

PRESIDENT		Goehl, R. O.	Grand Forks	Rand, C. C.	Grafton
T. Q. Benson	Grand Forks	Griffin, V. M.	Grand Forks	Ransom, H. R.	Grand Forks
SECRETARY		Grinnell, E. L.	Grand Forks	Robertson, F. O.	Grand Forks
A. F. Jensen	Grand Forks	Haagenson, E. C.	Grand Forks	Rud, H. O.	Grand Forks
Alger, L. J.	Grand Forks	Hardy, N. A.	Minto	Rud, M. B.	Grand Forks
Bartle, J. P.	Langdon	Haugen, C. O.	Larimore	Rystad, Olaf H.	Grand Forks
Benson, T. Q.	Grand Forks	Hetherington, J. E.	Grand Forks	Silverman, L.	Grand Forks
Benwell, H. D.	Grand Forks	Jensen, A. F.	Grand Forks	St. Clair, Robert T.	Northwood
Burrows, F. N.	Bathgate	Lamont, John G.	Grafton	Stratte, J. J.	Grand Forks
Brown, G. F.	Grand Forks	Landry, L. H.	Walhalla	Thorgrimson, G. G.	Grand Forks
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Countryman, G. L.	Grafton	Lohrbauer, L. T.	Grand Forks	Waldren, G. R.	Cavalier
Countryman, J. E.	Arch Cape, Ore.	Lommen, C. E.	Fordville	Waldren, H. M., Jr.	Drayton
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Carr, A., Sr.	Minot	Halverson, H. L.	Minot	Parnall, Edward	Minot
Carr, Andy M.	Minot	Hammargren, A. F.	Harvey	Ransom, E. M.	Minot
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Devine, J. L., Jr.	Minot	Johnson, C. G.	Rugby	Seiffert, G. S.	Minot
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★Roth, J. H.	Jamestown	★Swingle, A. J.	Mandan	Wolfe, F. E.	Oakes
Rowe, P. H.	Minot	Tainter, R.	Fargo	Wood, W. W.	Jamestown
Ruud, H. O.	Grand Forks	Thompson, A. M.	Wahpeton	Woodhull, R. B.	Minot
Ruud, M. B.	Grand Forks	Thorgrimson, G. G.	Grand Forks	Woodward, F. O.	Jamestown
Rystad, O. H.	Grand Forks	Timm, J. F.	Makoti	Woutat, P. H.	Grand Forks
Salomone, E. J.	Elgin	Tompkins, C. R.	Grafton	Wright, W. A.	Williston
Sand, Olaf	Fargo	Toomey, G. W.	Devils Lake	Yeomans, T. N.	Minot
Savre, M. T.	Northwood	Tronnes, Nels	Fargo	Youngs, N. A.	Grand Forks

★These members in military service.

Montana Holds 66th Annual Meeting

At Butte, Montana, July 13 and 14, the Montana state medical association held its 66th annual convention. The subjects and featured speakers were: Foreign Bodies in Air and Food Passages, Dr. Harry L. Baum, Denver, Colorado; Experiment in the Revival of Organisms, a film, J. B. S. Haldane, commentator; Treatment of Osteomyelitis, Dr. John K. Colman, Butte; Diagnosis of Common Skin Diseases and Dermatological Therapeutics (2 addresses) Dr. Henry Michelson, professor of dermatology at University of Minnesota, Minneapolis; Traumatic Injuries of the Abdomen and Indication for and Experiences with Total Gastrectomy (2 addresses), Dr. John M. Waugh, abdominal surgeon at Mayo Clinic, Rochester, Minnesota; Erythroblastosis, Dr. Elna M. Howard, Miles City; Use of Radiation Therapy in some Benign Conditions, Dr. John H. Bridenbaugh, Billings; Surgical Indication in Gastric Lesions, Dr. C. L. Bourdeau, Missoula; The Management of Functional Ovarian Cysts, Dr. Earl L. Hall, Great Falls; Roseola Infantum and Rythema Infectiosum, Dr. Orville M. Moore, Helena; Medical Observations in South China with some notes on the health situation in the Japanese internment camps, Dr. Chester W. Lawson, Glasgow.

In addition to these Dr. John Newton, Glasgow, who was a medical missionary in the Sino-Japanese war, told something of that experience. The program committee was composed of Dr. T. F. Walker, secretary of the state association, Great Falls, Dr. M. A. Shillington, Glendive and Dr. Harold Gregg, Butte.

Principal speaker at the convention banquet held at Butte Country Club with Dr. Pat E. Kane, Butte, toastmaster, was Senator E. G. Toomey of Helena. Members of Silver Bow county medical society of which Dr. J. E. Garvey, Butte, is president and its auxiliary, president of which is Mrs. Harold Schwartz, were the hosts to the Montana meeting.

Elected to office were: Dr. J. C. Shields, Butte, president; Dr. S. A. Cooney, Helena, president-elect; Dr. Thomas B. Moore, Jr., Kalispell, vice president; Dr. R. F. Peterson, Butte, secretary-treasurer.

Directly preceding the meeting of the Montana state medical association the Montana Academy of Oto-Ophthalmology held its 43rd semi-annual meeting. Speakers in this group included Dr. H. L. Baum, Denver, Colorado and Dr. Malcom C. Pfunder, Minneapolis.

A Suggested Therapeutic Procedure for the Treatment of Empyema by the Closed Method

A Preliminary Report

Earl E. Carpenter, M.D.†

Superior, Wisconsin

ALTHOUGH the open treatment of empyema is often necessary for cure, and is indeed recommended by many in all cases of empyema, it is felt that if the experience with closed treatment were more successful it would be used more prevalently since it presents obvious advantages. Not only is the open treatment more uncomfortable and more radical, but it often causes chronic sinuses in the chest wall that are painful and troublesome, and complicate future surgery such as thoracoplasty. Moreover, the open case at once becomes a "dirty one," a potential source of infection in a hospital.

We have, for a long time, been experimenting with different procedures in the closed treatment of empyema with results that have convinced us that there are advantages to be gained by our methods and that further study and work in this line of therapy is warranted. We long ago felt that the chronicity of the disease and its stubbornness to treatment are due to the heavy layer of pus-laden fibrin with its myriad bacteria that forms on the parietal and visceral pleurae. (These bacteria may be both specific and non-specific in character.) To wash out the empyema pocket is merely to remove the free pus, leaving intact the above mentioned deep layer, to act as a constant source of continued infection by the offending bacteria imprisoned in the fibro-exudate. We have felt, therefore, that the application of certain antiseptics or the sulfonamides to the outer surface of such a coating fails to reach the basic *cause of chronicity*, which lies deep in the substance of the puro-fibrinous layers.

The first problem that presents itself is the removal in some way of this infectious coating. A laboratory procedure gave us considerable experience in the handling of heavy purulent exudates. For the past several years we have been using the Petroff method of sputum concentration which involves the use of a wetting agent, "Tergitol B." Experience had taught us that inadequate amounts of wetting agent failed to liquify the heavy purulent exudate but that the gradual addition of "Tergitol B" accomplished the desired results admirably. Not only was the amount of wetting agent necessary directly proportionate to the amount and thickness of the exudate, but the time element proved also an important factor. The longer time the wetting agent was in contact the greater the liquifaction.

In working out our procedure clinically, Dakin's solution was first used. The dissolution of the exudate proceeded slowly but nevertheless some success was obtained in several stubborn cases. In seeking a better dissolving agent tetradecyl sulfate was tried in conjunction with

azochloramide. We scrupulously washed the empyema pocket with saline followed by tetradecyl azochloramide solution until all the pus was removed and the washings returned clear. This was an improvement but it did not fit into our theory, as developed by the above laboratory procedure, that the wetting agent should be left in contact with the fibro-purulent exudate which we were constantly fighting. Subsequently it was found that, *in vitro*, the longer the solution was left in one empyema pocket the more dissolution of the purulent layer took place. Results obtained did not satisfy us, however, that we had yet found a satisfactorily effective procedure.

The next step was to incorporate a successful antiseptic which would kill the bacteria freed by this liquifaction from the fibro-purulent layer lining the empyema pocket. A series of different substances were used. After every alternate aspiration and washing, one to two grams of sulfanilamide were instilled into the empyema pocket. Thus there was some improvement in our technic, but the comparative insolubility of the sulfanilamide offered a handicap and a more soluble substance was sought. Sodium sulfadiazine proved to be the most satisfactory drug used but the results were still not as spectacular as could be hoped for.

On investigation it was learned that certain protein factors found in exudates inhibit sulphonamide action. It has been known and demonstrated by Schmelkes and Wyss that when peptones and p-aminobenzoic acid are present (and they usually are in fibro-purulent exudates) the sulfonamides are naturally inhibited. Oxidizing agents destroy these natural inhibitors of the sulfonamides and render the latter much more active. Azochloramide is such an oxidizing agent. Thus, with the wetting oxidizing-sulfa solution we now had a three-edged therapeutic agent; (1) our wetting agent which dissolves the fibro-purulent layer and allows the therapeutic agents to penetrate this layer, (2) an oxidizing (and bactericidal) agent to destroy the inhibitors (peptones and p-aminobenzoic acid) of the sulfonamide and (3) the specific action of the sulfonamides themselves on bacterial-flora. The results of this combination on staph. aureus *in vitro* is given in the following:

POTENTIATION OF SULFANILAMIDE BY AZOCHLORAMIDE‡

Inoculum of Staph. Aureus — 2,000,000/ML.		Plate Counts	
Azochloramide	Sulfanilamide	24 Hr.	48 Hr.
0.4	0	33,000,000	126,000,000
0	20	93,000,000	34,000,000
0.4	20	10,000	120,000
Inoculated control		120,000,000	140,000,000

The rationale of using this combination in empyema pockets seems therefore self-evident. To our personal knowledge it has never been used before.

‡ Schmelkes and Wyss.

† Superintendent and Medical Director, Middle River Sanatorium, Hawthorne, Wisconsin.

It seems apparent from our experience that the sulfonamides are not made more toxic nor their characteristics changed chemically in the combination, since none of our patients have presented untoward effects and the combination has been used with apparent good results. It was suggested by Dr. Louis Nezworski, resident at our hospital, that the sodium sulfadiazine be incorporated in the azochloramide-tetradecyl solution and allowed to remain in the empyema pocket until the next aspiration. Eighty grains of sodium sulfadiazine were mixed in 100 to 200 cc. of the wetting agent-oxidizing solution and after the final washing the entire amount of mixture was instilled into the empyema pocket and allowed to remain. This procedure was repeated two to three times per week depending somewhat on the reaction of the patient and the results obtained. The weight and the amounts of sodium sulfadiazine and the wetting agent solution are determined by the size and weight of the patient, his reaction to the agents used, and of course the concentration in the blood stream of the sulfa drug. So far, signs of overdosage have not occurred. Since the sodium tetradecyl azochloramide solution is practically non-toxic, as much as 300 cc. of this substance in conjunction with the desired sulphonamide has been left in the empyema pocket without untoward effect.

Since it is the practice in our hospital to proceed cautiously when testing clinically any drug used, we automatically have used the utmost care with these solutions, particularly the sulfadiazine, and with the patients upon whom the procedure is contemplated. Caution is always in order and urged during the course of treatment. Observation of blood pictures both white and red, and urine examinations should be constant. X-ray and fluoroscopic control should be had at all times. The checking of intrathoracic pressures is necessary and the sulfonamide estimations in the blood stream should be carried on as an indication of how much absorption has taken place.

We immediately felt that the results with this method were better than all previous procedures. Notable was the prompt drop of fevers and the apparent rapid dissolution of the puro-fibrinous layer as demonstrated by the following report.

Case F. B. (No. 893). White, female, housewife, age 36. Entered with a diagnosis of empyema, right. (Patient has had pneumothorax, right, for about three years, initialed 9-21-40.) Loss of weight 52 lbs. Patient looks ill, feels weak. This individual, a former patient in our hospital, had left under pneumothorax and had had refills while under private treatment up until the first part of September 1943. During that month she developed fluid and three weeks later entered a hospital for treatment. Her chest was aspirated and approximately 1000 cc. of clear fluid was obtained. With succeeding aspirations the fluid became cloudy, thick and purulent. Massive saline irrigations, three times weekly for a period of about six weeks, did not seem to help materially in clearing up the empyema. Staphylococci were found and it was decided to try penicillin. She was transferred to another hospital where she was given penicillin therapy for about four weeks. The staphylococci apparently disappeared and it was thought that because the empyema persisted it was possibly tuberculous in origin. After her discharge from the hospital of former residence the patient enjoyed a fever-free period of a couple of weeks but thereafter the hyperpyrexia gradually returned so that for ten days previous to coming to us she had suffered fevers of 100° to 102°. Open drainage was then advocated but she wished to seek consultation at our institution because of her former residence here.

When admitted to this institution, Jan. 6, 1944, 50 cc. of thick almost gelatinous, grayish brown pus was aspirated. Pleural cavity was irrigated with normal saline and 50 cc. of sodium tetradecyl solution[§] was instilled. Patient tolerated this very well, so the following morning 100 cc. of sodium tetradecyl solution was instilled.

Jan. 12 — 375 cc. of grayish, brownish pus was aspirated. Chest was irrigated with normal saline and 400 cc. of sodium tetradecyl solution was instilled. Pressures adjusted. Temperature 98.8.

Jan. 18 — 650 cc. of purulent fluid was aspirated. Chest was irrigated with normal saline and 450 cc. of sodium tetradecyl solution was instilled. Pressures adjusted. Temperature 98.6.

Jan. 26 — 650 cc. of purulent fluid was aspirated. Chest irrigated with normal saline and 450 cc. of sodium tetradecyl solution plus sodium sulphadiazine was instilled. Pressures adjusted. Temperature 98.4.

Feb. 1—600 cc. of brown, thin, watery fluid was aspirated. Chest was irrigated with normal saline and 500 cc. of sodium tetradecyl solution and sulphadiazine solution was instilled. Temperature 98.4.

Feb. 8—600 cc. of clear yellow fluid was aspirated. Pressures adjusted. Treatment has been carried on at approximately weekly intervals and the fluid has been clear to date. Temperature 98.2.

Last aspiration, April 19, 1944. Fluid clear. 250 cc. Pressures adjusted. Temperature 98.4. No acid-fast or secondary pathogens found on smear or culture; these were probably killed by the anti-septics, but no doubt the organisms were harbored in the deep exudate. As fevers were reinstated before entrance (100° to 102°) active infection was obvious. The patient states, very definitely, that she did not begin to feel well until the fluid began to clear, the first part of February.

In this particular case the history reveals the marked stubbornness of chronic empyema treatment in the hands of doctors of unimpeachable medical skill, even when penicillin was used. In such a case there is always the possibility that although previous treatment had not been successful it may have been of contributory therapeutic benefit. However, the failure of closed treatment in this case had been at least tacitly admitted or open drainage or thoracoplasty would not have been advocated.

It may be of interest to note that we attempted to activate the sulfa drugs by withdrawing 100 cc. of blood from the patient, and extracting the serum, into which we introduced the sodium sulfadiazine and allowed the mixture to incubate for two hours at the usual incubator temperatures. When this mixture was introduced into the empyema pocket again we noted a spectacular and more prolonged drop in the fever course, and a definite improvement in the patient's general condition. Whether or not this will prove to be more valuable than we now know, particularly in attacking the acute empyema, has yet to be demonstrated, but it is offered as a possible procedure. We must always bear in mind, of course, the individual's possible sensitivity to drugs, but this can be pre-determined and tolerance built up before the instillation of the sulfa drug. In any case, should untoward effects result, the mixture can be removed by washing with saline and usual procedures taken to combat the effects of the sulfa drug. So far this unpleasant complication has not occurred, although we admit that extraordinary precautions have been used to reduce to a minimum any element of danger to the patient.

The technic may be summarized as follows: The empyema pocket is washed scrupulously clean with saline. A 17-gauge needle is perforated on the sides with a dental drill using a carburendum disk to cut the fenestrations. This has proved an excellent instrument to use in the procedure. It is not so large or traumatizing as a trocar and yet the four or five fenestrations permit the withdrawal of pus more readily than is possible through the ordinary needle's lumen. Should the pus be too thick, enough is withdrawn to allow the re-instillation of 50 cc. to 100 cc. of sodium tetradecyl sulphate azochloramide solution. By the next day this pus should begin to be thin enough to permit easy removal. Once the pus is completely removed and the empyema space washed clean, 100 cc. to 300 cc. of sodium tetradecyl-azochloramide solution plus the desired sulfonamide is instilled and allowed to remain in the cleansed empyema space. In our tuberculous empyemas we are incorporating diazone instead of sodium sulfadiazine with encouraging results.

Although only one case history has been here given, we have treated or are treating six other cases with results that we feel certain are superior to former methods. Since, however, these are not yet completed, we do not feel justified in reporting our results in these cases.

This is frankly a preliminary report of a special procedure and our results so far. Like all preliminary reports the writer has presented his experiment rather hesitantly. It is hoped that our suggestions will be tried by others working in the field of chest diseases and that a large number of cases may be evaluated to confirm or disprove the worth of these suggestions.

[§] Sodium tetradecyl sulphate with azochloramide.

Counterirritation

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PATHOLOGICAL PHYSIOLOGY OF COUNTERIRRITATION

THERE is no older therapy in the dentist's and physician's armamentarium than the relief of pain by counterirritation. Although early attempts often resulted in serious burns, scars and even mutilations from the injudicious use of severe caustics, chemicals and heat, the professional world has long since abandoned damaging irritants. Early explanations of counterirritation smacked of sorcery and demons, for the pronounced purpose was to withdraw evils or poisons from deep within the body to the surface where they could be eliminated or destroyed. But what has withstood the test of time is the observation that counterirritation applied locally often relieves pain arising from neighboring or deep-seated lesions. What was at first an empirical procedure is now rationally justified.

Visceral pain is often manifest by cutaneous pain, the so-called "referred pain." This is due to the visceral stimulation of a nerve from a spinal segment whose normal pain reception is only concerned with a definite cutaneous segment. The misinterpretation of the pain, and the actual physiologic disturbances in the cutaneous segment to which pain is "referred," form the basis of the conception of "referred pain." Counterirritation is, indeed, the opposite of "referred pain," since it involves the stimulation of cutaneous sensory nerves to bring about a physiologic response in the more deeply-seated tissues or organs. Irritation of the skin may relieve inflammation in deeper-seated structures, diminishing the pain, possibly the congestion, and perhaps leading to an earlier and more conservative termination (Sollman, 1942). Many investigators feel that counterirritation affects the adjacent or neighboring tissues more than deep-seated organs. Vasomotor reflexes, which are elicited by counterirritation in "reversing referred pain," explains the generally known fact that counterirritation is most effective when applied at a definite place for each internal inflammation. Inflammation is often inseparable from the processes of immunity which limit and combat the agents which produce inflammatory changes. Counterirritants produce tissue changes of a nature similar to the inflammatory reactions themselves and are thus theoretically able to augment local immunity. As a matter of practical consideration, different irritants varying in their intensity can produce changes from the mildest hyperemia to necrosis. There is no difficulty in concocting a potent counterirritant which can be shown to manifest inflammatory and vasomotor reactions, but while the ideal preparation must be sufficiently strong and act for a period of time long enough to augment or summate favorable inflammatory changes and produce a definite sensory reaction, it must be mild enough so that no tissue destruction is effected.

The physiologic effects of irritants have been amply demonstrated upon normal organs and deep tissues, but

experimental studies of counterirritants in the presence of previously induced and controlled inflammatory changes are difficult to find; i. e., the pathological physiology of counterirritation and not irritation. It is the purpose of this paper to present the current conception of the pathological physiology of counterirritation and inflammation. The therapeutic approach of pain from the approximate anatomical site of pain and not the higher cerebral centers is worthy of serious consideration.

PRESENT STATUS OF COUNTERIRRITATION

In actual practice, the use of counterirritants often relieves discomfort, although it is doubtful whether these exert any profound effect upon the course of visceral disease (Barr, 1940). One should not assume otherwise. While, for example, the cutaneous application of counterirritation in the form of heat, cold or drugs (poultices, etc.) may bring some relief of pain, for example, in acute abdominal or intra-thoracic disease, there is absolutely no convincing evidence that the fundamental course of deep-seated infection is altered.

Wayne (1940) reported that counterirritation was of considerable value in superficial lesions, and that counterirritant drugs produce essentially the same effect as heat. Expressing the belief that the reflex effect in deep-seated organs was a simple hyperemia, Wayne believed it might not have any beneficial effect on the visceral disease processes.

The application of counterirritants for somewhat juxtaposed lesions is, perhaps, different. Local heat or counterirritant drugs may abort or favorably affect an inflammatory process in the immediate vicinity of the counterirritation. One need only cite, as examples localized cellulitis and abscesses. Relief of pain or discomfort and the effect upon inflammatory processes is probably mediated largely through the nervous system with resultant vasomotor changes. However, Gammon and Starr (1941) concluded from their experimental work that the relief of pain by counterirritation is not due to circulatory changes, *per se*.

Much of the clinical literature is contradictory because the relief of pain is a subjective phenomenon which is difficult to express quantitatively in terms which can be faithfully reproduced or compared by another investigator. Add to this the fact that a variety of counterirritants are employed clinically, and that they are often merely adjuncts to other therapy administered simultaneously. An interesting observation in this regard is that of Hardy, Wolff and Goodell (1940) who devised a simple method for the measurement of pain and found that the threshold for pain can be raised by 35 per cent if a second painful stimulus is simultaneously used, even if at a distant focus.

Kaletsy (1942) extensively reviewed the literature of counterirritation and after considering heliotherapy, ther-

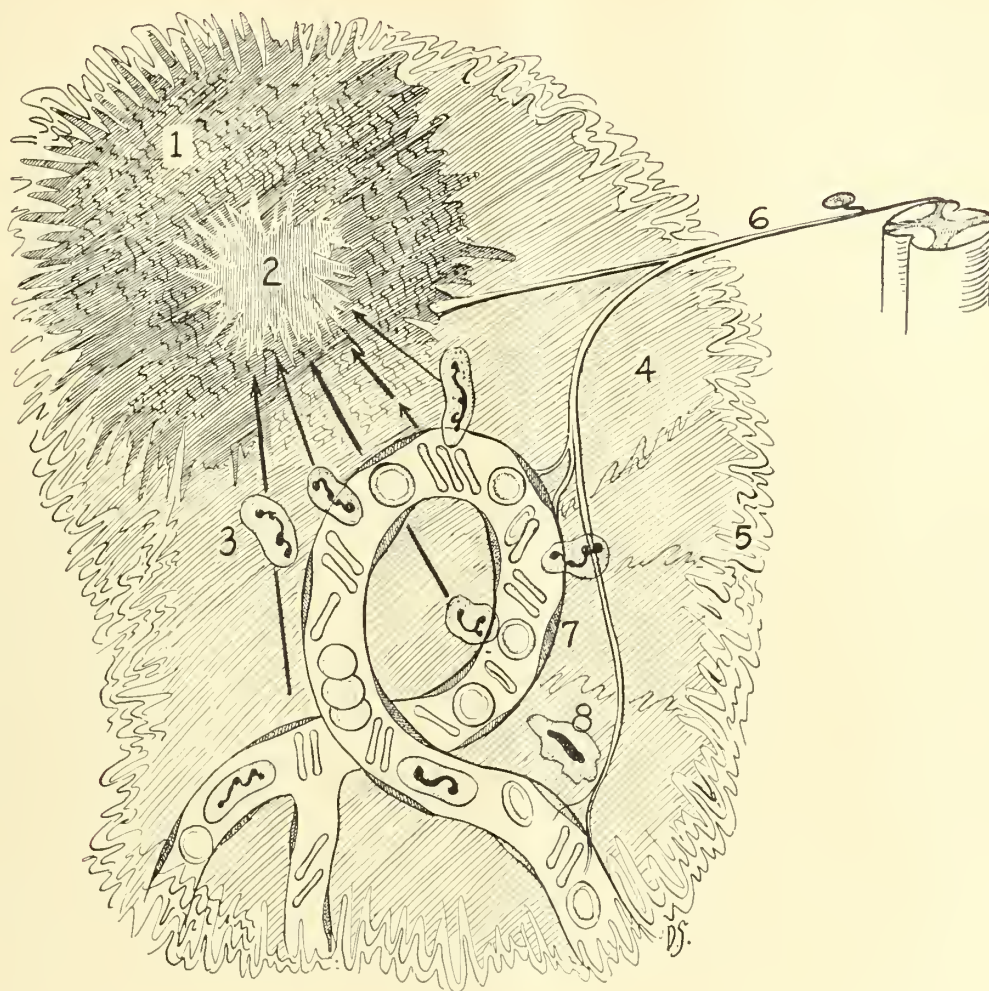


Fig. 1

motherapy, cauter, rubefacients, epistastics, escharotics, purifacients, cantharidin, iodine, mustard, silver nitrate, turpentine and various mild counterirritants, concluded that: (1) most of the published material is based upon clinical observations, not meticulous scientific investigation; (2) the actual mechanism of counterirritation is not thoroughly understood or even agreed upon; (3) counterirritation undoubtedly has some therapeutic value; (4) the hyperemia produced creates to some extent a favorable response which apparently controls pain and has a tendency to reduce the severity of the original condition.

Fortunately, there are truly critical and adequately controlled studies of inflammation and the vasomotor system. For our purpose we need not consider the clinical side other than to accept the observation of relief of pain under certain conditions. We are then free to search in experimental work for a rational explanation.

INFLAMMATION

Inflammation is defined by Bell (1942) as the local defensive reaction which occurs when injurious agents penetrate the tissues. Systemic defensive mechanisms such as leucocytosis, fever, and the formation of immune

bodies are not considered a part of the inflammatory process. The purpose of this defensive reaction, he points out, is to destroy or wall off the irritant, to neutralize any toxic substances, and remove necrotic debris. Although the phenomena of repair are not strictly a part of inflammation, they are often difficult to distinguish from it. The pathologic picture includes the passage of fluid out of the capillaries (serous exudate or edema), escape of leucocytes into the tissue (cellular exudate), migration of phagocytic cells from adjacent tissues, and proliferation of fixed tissue cells and a fibroblastic response. The inflammatory process itself tends to bring about its own remedy in the phagocytosis and neutralization of toxic substances. Pain is due to the irritation of sensory nerves by tension of swollen tissues and the direct action of toxic substances. To combat the pain at the site of origin would, therefore, involve reduction in serous exudate and removal or neutralization of toxic substances. In the early course of inflammation, when pain is most intense, the inflammatory process encourages the painful serous exudate and congestion, while heat or other local therapy may help overcome congestion and assist in bringing more leucocytes to the local lesion.

The nervous system does not influence the immediate inflammatory process to a great extent, although axon reflexes may be of great importance. Vasomotor response to sympathetic (autonomic) nervous impulses is important, for when the sympathetic nerves are sectioned, congestion is more pronounced (Bell). The elimination of the sympathetic vasoconstriction following unilateral sympathetic ganglionectomy in the rabbit results in more rapid healing of lesions on the operated as compared to the unoperated side (Danilewski, 1883).

Valy Menkin (1938), in his comprehensive review of inflammation, points out that the manifestations of inflammation tend to develop along a uniform pattern irrespective of the irritant. Foreign substances, viable or non-viable, in contact with normal tissue, induce an inflammatory reaction, the intensity of which may vary from a barely discernible hyperemia to an intense suppurative process. Menkin defines this response as a complex vascular, lymphatic, and local tissue reaction whereby the deleterious agents tend to be localized and ultimately destroyed. The inflammatory reaction may be truly considered as an immunological mechanism of definite significance. (Fig. 1).

The early increased intracapillary pressure and increased capillary permeability favor the formation of edema or plasma exudate. Following an initial vasoconstriction, there is very soon a local vasodilatation and an increase in the actual number of functioning capillaries (Menkin, 1938). In agreement with Menkin's work, Landis (1931) reported that capillary dilatation in hyperemia or inflammation is accompanied by an increased capillary pressure. Landis was able to produce arteriolar vasodilatation and increase capillary pressure by irritating the skin of the web of a frog's foot with silver nitrate and thereby stimulating axon reflexes.

Menkin (1936) found that various types of inflammatory exudates induced in normal dogs and rabbits by a chemical irritant or by a burn, would induce a prompt increase in capillary permeability as evidenced by the fact that when trypan blue dye was injected intravenously, it accumulated in the involved areas, seeping through the capillaries. Although earlier work suggested that this permeability promoting substance might be histamine or an hypothetical histamine-like substance called "H" substance, Menkin was able to isolate the active permeability-promoting factor and show that it was not histamine or the "H" substance. The active factor which he isolated was called "Leucotaxine", because of its chemotactic property of attracting leucocytes. Its liberation was considered to be related to the interference with normal protein catabolism (Menkin, 1941). Despite the report of Silva and Dragstedt (1940) that histamine liberation is responsible for the escape of trypan blue in tissue, the work of Menkin is most widely accepted.

The increased permeability permits the plasma proteins, including fibrinogen, to escape into the inflamed tissues with the early formation of a fibrin network which circumscribes the irritant. Vigorous manipulation of acutely infected tissue may break down this fibrin barrier and allow the dissemination of bacteria. The fixation at the site of inflammation is primarily due to me-

chanical obstruction caused by the fibrin network and the occlusion of lymphatic vessels (Menkin, 1938). The cytologic changes can be closely correlated with local changes in hydrogen ion concentration (pH).

Although the formation of antibodies is not strictly a part of inflammation, there is some evidence that the action of antibodies brought in the serum to the site of inflammation are of considerable importance in localizing a bacterial inflammation. There may be a local formation of immune bodies (Cannon).

Hudack and McMaster (1933) clearly demonstrated that in the initial stage of an acute inflammation, there is an increased permeability of the lymphatics and as others have also shown, a parallel increase in lymph flow and pressure.

VASOMOTOR SYSTEM AND COUNTERIRRITATION

The vascular bed is under the control of the sympathetic nervous system. To the blood vessels go vasoconstrictor and vasodilator nerves. The vasomotor center is located in the floor of the fourth ventricle of the medulla oblongata (Brushsteyn, 1933), while the highest centers for the vasomotor system are probably in the cerebral cortex and hypothalamus. Vasomotor reflexes can be elicited by stimulation of practically any efferent somatic or visceral nerve. Normally the vessels possess a certain tone due to vasoconstrictor action. All of the vasoconstrictor sympathetic fibers arise from the group of cells in the lateral horn of the spinal cord from the first thoracic to the second or third lumbar segments, and all of the arterioles of the body are supplied from these segments. The vasoconstrictor fibers to the head and neck arise from the first two thoracic segments, pass to the superior cervical ganglion from which plexuses of fibers investing blood vessels or accompanying nerves reach the most superficial arterioles (Best and Taylor, 1943). The cephalic region is probably without afferent sympathetic fibers. The vasoconstrictor fibers probably act through the liberation of an adrenalin-like substance at their nerve endings. (Miller, 1942).

The vasodilator fibers have origin from more diverse source than the vasoconstrictor fibers, probably arising in the parasympathetic cranial and possibly the thoracolumbar segments. The fibers to the head course through the seventh, ninth and tenth cranial nerves and the cervical sympathetics.

In 1852, Claude Bernard observed that the stimulation of the cervical sympathetic nerves constricted the blood vessels of a rabbit's ear. Dastre and Morar (1880) observed flushing of the buccal mucosa upon stimulation of the cervical sympathetics, and this was confirmed by Langley and Anderson (1894), Carlson (1907), and by others.

Bruce (1913) showed that superficial vasodilatation resulted from cutaneous or conjunctival stimulation and offered convincing evidence that these reactions depended upon axon reflexes. The axon reflex—sometimes called the Sokownin reflex—is often cited as an example of an autonomic reflex, although strictly speaking it is not a reflex since no nerve cell is involved and the entire "reflex" occurs outside the spinal cord. In man, this is

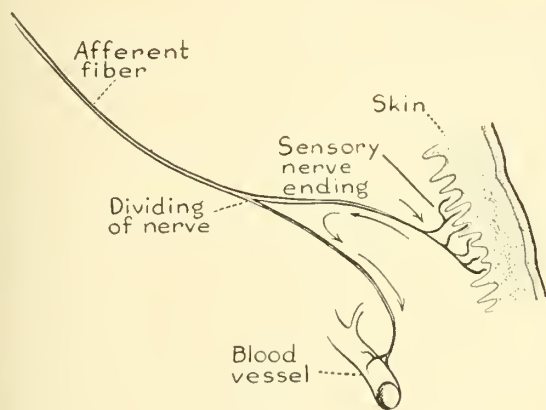


Fig. 2

usually demonstrated as a localized reaction in the skin. The most familiar type of axon reflex is that which involves a sensory nerve fiber through which vasodilatation is brought about. (Fig. 2). The afferent and efferent limbs of the axon reflex are formed by the branching of a single nerve fiber. Stimulation of one branch produces an impulse which travels centrally to the point of division where it is reflected down the other branch to an effector organ. In the second arm of the "reflex", the impulse travels in the efferent direction in a normally afferent nerve.

Bruce found that dilatation of the conjunctival blood vessels from the application of mustard oil irritant could be prevented if the sensory nerve endings are first paralyzed by cocaine or alypin (which does not locally affect the blood vessels). If the irritant is applied shortly after division of the fifth nerve, which also renders the conjunctiva insensible, the usual inflammatory reaction occurs. However, if the sensory fiber has degenerated, the irritant does not produce the reaction. This local reaction explains the close association of the transmission of pain and vasodilator effects.

The vasodilator reflexes are dependent upon the integrity of the sensory nerve fibers. Inflammatory reactions in rabbits anesthetized with alcohol or ether do not cause the usual edema and hyperemia as in the normal rabbit (Cressman and Rigdon, 1939).

Woolard and Phillip (1932) blocked peripheral nerves with local anesthetics and found that the cutaneous hyperemia which follows the analgesia corresponded with the area of cutaneous anesthesia, and, therefore, the peripheral distribution of the sympathetic fibers corresponds with the sensory fibers. Richard's recent work (1943) on wartime injuries of peripheral nerves, revealed essentially the same. In addition, he noted that after division of a peripheral nerve, the vasomotor state of the denervated area passed through two phases; an initial vasodilatation due to the interruption of the sympathetic fibers (warm phase), and a second and permanent cold phase in which the temperature of the area approximated the environment.

The capillaries, which, unlike the arterioles, do not possess muscular walls are nevertheless also under sympathetic control. Beecher (1936) studied capillary changes

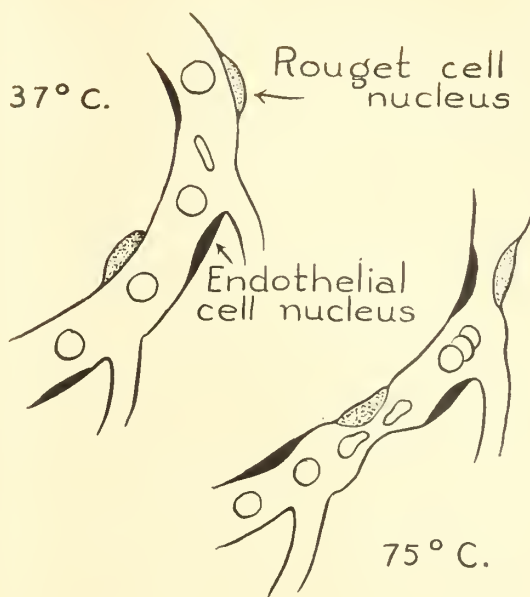


Fig. 3

in the ear of intact unanesthetized rabbits by a microscopic tissue chamber technic. He showed that both the Rouget and the endothelial cells, the two structural elements of the capillary wall, respond to several types of stimulation by reducing or stopping the capillary circulation. Rouget cells act by constricting the capillaries, the endothelial nuclei by swelling and blocking the lumen. This activity can be swift. Stimuli which were found to produce this effect were local cooling, general body cooling, induction shocks, anoxemia, fright, pain and epinephrin. The capillary endothelium and the Rouget cells were shown to be under the influence of the sympathetic nervous system. Opening of the capillaries with heat required only one second; closing with cold, usually five or six seconds (Fig. 3).

Wilkins (1942) has summarized the literature on the sympathetic control of the peripheral vascular system with special consideration of the circulation of the limbs and vascular diseases of the extremities.

The sensations of temperature induced by physical changes are important since they are associated with reflex changes. When any part of a skin surface is exposed to temperature changes, there occurs a vasodilation in response to warmth, and a vasoconstriction to cold. Bazett (1927) found a rise in temperature caused local dilatation of the capillaries and a resultant capillary pulsation which is probably the result of arterial dilatation—a vasodilation which can be demonstrated by an increase in the volume of the part of the body warmed and by a more rapid circulation rate. To some extent, these effects can be produced by physical or chemical means. Local application of heat increases phagocytic and local metabolic activity (Krusen, 1941).

Of importance in the vasomotor problem is the anatomy and physiology of the vascular bed with which one is concerned. The finer capillary structure of the skin (Grigorowa, 1932) and buccal or lip mucosa already

have been extensively studied (Fisher, 1933), although the gingival circulation has been somewhat neglected. Landis (1936) presented a general review of vascular physiology and clinical medicine and more recently, Sculphin, de Takats, von Dellen and Marcus (1942) have collectively reviewed vascular diseases with consideration of the more fundamental pathological physiology.

Counterirritants are applied to gingival or buccal mucosa with the purpose of stimulating sensory nerve endings and eliciting directly or through axon reflexes vasomotor responses in neighboring and deeper structures. In addition to vasomotor responses, irritants may produce inflammatory changes of a beneficial nature (see Fig. 1). Painful inflammatory lesions, discomfort following traumatic procedures, minor irritations and neuralgias may be benefited by the therapy of local counterirritation.

The nerves of the jaw, teeth and subcutaneous tissues as well as mucosal surfaces are branches of the fifth (trigeminal) nerve. A careful study of the nerve endings of the teeth by Tiegs (1932) revealed termination of fine filamentous branches under the dentine by end organs on the odontoblast processes. The blood vessels of the pulp (Sellman, 1939) of the enamel organ (Jump, 1938) and the gums (Pelzer, 1940) are probably all interrelated. Bach and Redisch (1931, 1932) have interestingly employed capillarioscopy in the diagnosis of pyorrhea alveolaris.

Moore, Moore and Singleton (1934) claimed that the chemical changes such as the accumulation of acids in inflamed areas, was of more importance in causing pain than tissue tension. They believed that the pain which accompanied ischemia resulted mainly from the local accumulation of acid metabolites. Active hyperemia may help remove these products.

SUMMARY

Counterirritation is a valuable therapeutic procedure when indicated.

Counterirritation augments the local mechanisms of inflammation and immunity, and while it may not influence the course of visceral lesions, appears to favorably affect the more superficial lesions.

Counterirritation acts physiologically through the medium of the axon reflex with resultant sympathetic vasomotor changes, and to some extent through subjective sensory effect.

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News-Letter of the American Student Health Association

Philadelphia Plan Increases Treatment of Venereal Diseases by Private Practitioners. The publication and distribution of the "Bulletin of Physicians in Philadelphia who will Accept for Examination and Treatment in Private Practice Patients with Gonorrhoea and Syphilis" has resulted in:

(a) "An orderly and controlled redistribution of patients who are public health problems."

(b) "An increased participation in the (venereal disease control) program by the private physician."

There has been a "44 percent increase in the number of physicians known to be caring for gonorrhoea and syphilis patients in private practice as well as an increase in the average number of patients under the care of a single physician at any one time."

Smallpox Incidence in United States at New Low.

The May, 1944 issue of the Statistical Bulletin of the Metropolitan Life Insurance Company reports that in 1943 there were only 789 cases of smallpox with less than 10 deaths in the entire U. S. This represents a 12 percent decrease from the previous low mark of 900 cases in 1942.

Nine states and the District of Columbia reported no smallpox cases in 1943. More than one half of all cases in the country were reported from four states: Indiana (129); Ohio (118); Texas (86); and Illinois (68).

Vaccine Inactivated by Ultra-violet Light. Levinson, Milzer, Shaughnessy, Neal and Oppenheimer (J.A.M.A., June 24, 1944) report the production of potent vaccines of *Escherichia coli*, *Eberthella typhosa* (strain 58), *Salmonella enteritidis*, *Staphylococcus aureus*, *Streptococcus viridans*, and *Diplococcus pneumonia* (Type 1) with inactivation by means of ultra-violet light.

Suspensions of these organisms, containing 1 billion organisms per cc., in continuously flowing thin films (less than 1 mm.) are exposed to the rays of a newly developed lamp which is a powerful source of both total and short-wave (below 2,000 angstrom units in length) ultra-violet rays. Complete killing of these organisms is accomplished in 0.17 to 0.33 second. Successful results were also reported for rabies virus vaccine (irradiated 0.17 to 0.33 second) and for St. Louis encephalitis virus (irradiated 0.34 to 0.66 second).

The Natural Course of Poliomyelitis. The widespread publicity given the "Kenny Treatment" of poliomyelitis has aroused interest in the general question as to the natural course of the disease in the absence of that treatment. Mary Sherman (J.A.M.A., May 13, 1944,) provides an answer to that question in 70 cases which except for supportive treatment were permitted to run their natural course. The results were as follows:

(a) 8.6 percent died.

(b) 10.0 percent have enough residual weakness to require braces or future surgery.

(c) 8.6 percent have functionally significant weakness

which does not require further therapy and which does not constitute a handicap to a normal life.

(d) 72.8 percent have no residual weakness or such slight weakness that it is barely detectable.

(e) The average hospital stay excluding the fatal cases but including readmissions for supervised physical activity, was 17.9 days.

Moderate Doses of Sulfadiazine Have No Measurable Effect on Coordination and Reaction Time of Young Men. Because of the widespread use of sulfadiazine to control streptococcal and meningococcal infections the question of the effect of this drug on coordination and reaction time becomes of immediate importance in military life and in accident control work.

Price and Pedulla (J.A.M.A., May 13, 1944) report that in 90 healthy young men 19 grams of sulfadiazine given 1 gram every 4 hours after an initial dose of 2 grams, produced no measurable effect on the coordination and reaction time.

A special apparatus which simulated actual working conditions was used to compare the treated group with the control group. Eye-hand coordination and reaction times were recorded by an electric clock. Tests were made before therapy, during therapy and 7 days after the administration of the drug was discontinued.

Time Required for Reliable Registration by Oral Thermometers. De Nosaquo, Kerlan, Knudsen and Klumpp (Jour. of Lab. & Clin. Med., Feb. 1944) after study of over 1,000 clinical thermometers from various parts of the U. S. conclude:

(1) That only 800 of the 1,000 thermometers examined were found to meet the requirements and tests specified by the Bureau of Standards.

(2) The character and use of the mercury column under clinical conditions is different from that under laboratory conditions.

(3) The markings on thermometers "1 minute", "1/2 minute" and "60 seconds" had no significance since all required about the same length of time for the instrument to reach equilibrium.

(4) Three minutes should be the minimum length of time allotted for an oral thermometer to reach equilibrium under ordinary conditions of use.

Results of Prophylactic Immunization Against Whooping Cough. In view of the discrepancies between previous reports, the report of Dungal, Thoroddsen and Agustsson (J.A.M.A., May 20, 1944) is of considerable interest. These workers in Iceland used a vaccine standardized at 8,000 million organisms per cc. and recommended an initial injection of 0.5 cc. followed at intervals of 4 to 7 days by 3 injections of 1 cc. each. Each child received 28,000 million organisms in the course of 12 to 20 days. Approximately 5,000 children were vaccinated and of these 888 were followed up and reported upon, of these only 770 were fully vaccinated. The results were as follows:

Among 770 children between 0 and 8 years fully vaccinated against whooping cough.		Among 122 unvaccinated controls.
Got no pertussis	28.3%	4.9%
Got mild pertussis	49.5	49.2
Got medium pertussis	16.9	34.4
Got grave pertussis	5.3	11.5

Toxicity of Boric Acid. Evidence has been accumulated at the Naval Medical Research Institute that indicates that boric acid applied either in the form of an ointment or a saturated solution to extensive wounds or burns is absorbed and acts as a cumulative poison. Petrolatum is therefore preferable to boric acid ointment for application to extensive burns.

Acute Infectious Lymphocytosis. Carl H. Smith (J.A.M.A., June 3, 1944) reports four more cases of this condition to add to five others he has observed in various hospitals of N.Y.C. within the past two years. The outstanding characteristics of the disease are:

(1) A relative and absolute lymphocytosis due to an increase of normal small lymphocytes and persisting 3 to 5 weeks.

(2) Rather marked communicability with a possible incubation period of 12 to 21 days.

(3) Clinical signs and symptoms may include those of an upper respiratory infection, vomiting, fever, or abdominal symptoms. Symptoms may be so mild as to escape attention.

(4) The lymphadenopathy, palpable spleen and positive heterophile agglutination reaction often found in infectious mononucleosis, are uniformly lacking in this disease.

(5) The disease is without complications so far as has been determined.

Nutritive Value of Canned or Dehydrated Meats. Rice and Robinson (A.J.P.H. of June, 1944) as the result of their studies conclude as follows:

1. Canning or dehydration of meat does not markedly reduce its nutritive quality; of the changes that do take place the greatest changes are in the thiamin and pantothenic acid potencies.

2. During storage of processed meat at temperatures up to 99° F. there is little or no loss of niacin, riboflavin, or pantothenic acid over a period of 219 days; thiamin,

however, decreases more rapidly, showing some loss at 80° F. and in canned pork after 293 days a loss of 48 percent.

3. Dehydrated pork after 219 days at 80° F. retains only 29 percent of its thiamin, while at higher temperatures the destruction of thiamin is practically complete.

Typhoid Fever Epidemic from Cheese. In Public Health Reports (April 21, 1944 issue) there is reported an epidemic of 225 proved cases of typhoid fever with 12 deaths, all as the result of eating green cheese made from typhoid infected unpasteurized milk. The cases were scattered over 18 counties in the northern part of Indiana. During December 1943, unpasteurized milk was used in making cheese by a plant in the central part of Indiana. Typhoid organisms were apparently present in that milk and consequently in the manufactured cheese. Instead of aging the cheese, as is the usual rule, the manufacturer sold it while green. If the cheese had been permitted to age before being put on the market it is suggested that the typhoid organisms would have died a natural death and would not have been able to cause infection. It is assumed that the typhoid organisms got into the milk from a farmer or dairyman who was a carrier.

Water-borne Tularemia in Western Canada. Bow and Brown (Can. Med. Assoc. Jour., January 1944) again call attention to the fact first pointed out in Russia by Karpoff and Antonoff in 1936, that tularemia in sheep, rabbits, ground squirrels, field mice, beaver, etc. may result in infection of water supplies and thus in transfer of the infection to humans.

Metatarsalgia. Baker and Kuhn (Southern Med. Jour., March 1944) report curing 14 cases of metatarsalgia by removing tumors of the fourth plantar digital nerve lying in the web space between the third and fourth toes. This confirms the operative results reported by Betts and by McElvenny and apparently disproves Morton's hypotheses as to the condition. As to why or how repeated trauma brings about the condition is not clear but it appears to be a degenerative fibrosis of the nerve with neuromatous proliferation.

Changes in Mortality 1900 - 1940. An editorial in the June 1944 issue of the A.J.P.H. includes the following table on communicable disease in the U. S.:

CHANGES IN MORTALITY

1900 - 1940

	Death rate per 100,000		Percent Reduction	Actual Deaths 1940	Deaths which would have occurred in 1940 at 1900 rates	Number of lives saved per year
	1900	1940				
Typhoid and paratyphoid fevers	35.9	1.1	97	1,443	47,173	45,736
Diphtheria	43.3	1.1	97	1,457	56,896	55,439
Diarrhea and enteritis	133.2	10.3	92	13,573	175,025	161,452
Measles, scarlet fever and whooping cough	34.8	3.2	91	4,300	45,727	41,427
Tuberculosis	201.2	45.9	77	60,428	264,377	203,949
Pneumonia and Influenza	180.5	70.3	61	92,525	237,177	144,652
All other causes	1,126.1	944.5	16	1,243,543	1,479,695	236,152

(Continued on thirteenth page following)



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**POST-WAR EFFECTS OF ACCELERATED
MEDICAL PROGRAM**

Never has medical education been confronted by so many complex problems as now.

It is generally conceded that the evaluation of a profession should be based upon the relative responsibility involved in its practice, and because medicine deals with life and death it heads the list. The appraisal of a profession by its own members is expressed by the standards they fix for themselves. Through the effort of enlightened members to advance the cultural, educational and practical standards of medicine in this twentieth century a premedical course was established, the regular curriculum lengthened and a full year of internship in an acceptable hospital required before the degree of doctor of medicine was conferred. Basic science and state board examinations had to be passed, and even then many take time out every year to attend clinics and post-graduate schools.

After all this constructive work, the exigencies of war thrust upon the medical schools the necessity of a drastic revision of their curricula to conform to an acceleration program that would speed up the supply of medical men in the armed forces. When the young medical officers who were compelled to take this hurried and somewhat abbreviated course return, there will be a period of social and economic adjustment of no small magnitude. There will be at first a reduced student enrollment as medical schools decelerate but this will not leave the teaching body idle. Schools and affiliated hospitals will be called upon to assist returning physicians to make up for their deficiencies in both the medical sciences and the clinical fields. We have full confidence that the same constructive forces that have cherished high standards for medical education in the past foresee now and plan to meet these needs.

A.E.H.

NORTH DAKOTA MEDICINE LOOKS AHEAD

Each member of the North Dakota State Medical Association is urged to read carefully this issue containing the transactions of the 57th annual session since it represents the efforts of many members to promote the public health in North Dakota and to elevate the professional and economic standards of our profession.

A study of the transactions reveals a deep concern with the future of medicine in the postwar period. Most students of the problem agree that some change is inevitable but there is disagreement over the character and extent of the change. The great majority of North Dakota physicians are committed, it is believed, to any program which will provide more and better medical care to all citizens. But this same majority is convinced that such a program, to be successful, must preserve the principles of free enterprise and free choice of physician. Bureaucratic control of the medical profession, no matter how accomplished, will inevitably result in the deterioration of the standard of medical practice in our country. North Dakota physicians will fight any plan which threatens to jeopardize this standard. (See "News Items").

Postwar planning for anything and everything is popular these days. Much of it seems to be directed from Washington. Many agencies, federal and state, assert that medical care is inadequate at present, and that something should be done about it. Most of them forget that fully one-third of America's physicians are in the armed services, and that the unprecedented economic prosperity and scarcity of goods during the war has caused people to seek and demand medical attention for conditions, too often of a minor nature, which they would disregard in ordinary times. The reformers forget that fifty thousand physicians will return to private practice when the war is over. They also neglect to consider the basic truth that a prosperous people, including labor, agriculture and the white collared class, want to choose their own physicians and hospitals and are always willing to pay a reasonable price for the services rendered.

In its plans for the postwar period, the North Dakota state medical association directs its attention to three problems. First, the return of North Dakota physicians in the service to their former locations. Second, the raising of medical practice in the state to higher levels by the encouragement of postgraduate study and refresher courses. Third, getting the patient to the physician. The latter involves education of the public to the value of medical service, the transportation of patients to centers for diagnosis and treatment, and a sound economy which will permit individuals to pay for the services rendered. Prepaid, voluntary hospital and medical service insurance plans will assist materially in this respect, and the Association is now studying the possibility of sponsoring a prepaid medical insurance plan which will be sound and workable.

L.W.L.

TREATMENT OF FLUID AND PUS IN THE PLEURAL CAVITY

Dr. Carpenter's paper in this issue on the treatment of empyema is an extremely significant one.

Fluid or pus in the pleural cavity, whether accompanied by spontaneous or artificial pneumothorax, is a condition for serious consideration. When only clear fluid is present there is always an underlying cause which may be serious. Fluid in sufficient quantity to obstruct the view of the lung on x-ray film inspection should be removed in one or two sittings immediately after which x-ray film inspection should be made of the chest to determine whether any gross lesion exists in the lung. If such a lesion is found and is proved to be tuberculous, the physician can promptly institute artificial pneumothorax and thus continue the collapse of the lung which nature has begun. However, if this opportunity is allowed to pass as the fluid absorbs, the visceral and parietal layers of pleura become adherent and when the lesion is then visualized the pleural space is obliterated, thus making a simple and effective form of treatment impossible. Again, a bronchogenic carcinoma may be present, and if one waits for the fluid to absorb before detecting it there is strong likelihood that it will have metastasized, thus rendering lobectomy or total pneumonectomy useless.

Pus which accumulates in the pleural cavity in the course of artificial pneumothorax treatment may be due to the tubercle bacillus or to any one of the pyogenic organisms frequently found in the bronchial tree and particularly in lung lesions. Nontuberculous empyema in pneumothorax has been one of the most serious complications. Formerly the organisms were thought to be transmitted through the needle to the pleural cavity. However, inspection with the thoracoscope and the use of methylene blue introduced directly into the pleural cavity have shown that a broncho-pleural fistula nearly always constitutes the source of the infection. The subsequent and ultimate treatment of the empyema is dependent largely upon the size of the fistula and whether it closes spontaneously. Small fistulae usually close in a short time but larger ones remain open and continue to admit pyogenic organisms to the pleural cavity. In such cases it is often necessary to close the fistula by one of the surgical procedures before one can hope to effect a cure of the empyema. However, in those cases in which only a small fistula is present and which closes within a short time as indicated by failure of the patient to expectorate methylene blue introduced into the empyema cavity, until recently no specific method of treatment has been available. Most cases were aspirated and irrigated frequently with various solutions. In the occasional one the pyogenic organisms would disappear but in the majority the physician waited until the empyema became chronic and then recommended thoracoplasty in order to continue collapse of the diseased lung to close the empyema cavity.

Carpenter in this issue of the JOURNAL-LANCET describes a method which he has devised for using the sulfonamides directly in the empyema cavity. The rationale of his treatment is obvious. Unless the drug reaches the organisms the futility of its administration is clear. The empyema cavity should be made as clean as possible. Ordinary aspiration and irrigation do not always accomplish this result, but Carpenter's method should be

satisfactory because he removes the heavy layers of pus-laden fibrin with its large bacterial content from the parietal and visceral pleurae. By ordinary aspiration this remains intact and only the free pus is removed from the pleural cavity. He then introduces the sulfonamide-containing solution and has obtained good results.

When empyema is produced by one or more organisms for which penicillin is effective, particularly staphylococci and possibly streptococci, it should be employed because of its prompt action. Here, the same principle holds true with reference to cleansing the empyema cavity as described by Carpenter. When this has been accomplished 30,000 to 40,000 units of penicillin in normal physiological saline solution should be injected directly into the empyema cavity twice every twenty-four hours. Inasmuch as six to eight hours are required for penicillin to produce its best effect, obviously this solution should not be used for irrigation but retained in the pleural cavity.

Thus, with the new drugs which have some specificity for organisms which frequently invade the pleural cavity and with Carpenter's method of preparing the space for their administration, it appears that the need will decrease for open drainage and thoracoplasty in the treatment of empyema complicating artificial or spontaneous pneumothorax.

J.A.M.

Book Reviews

Minor Surgery, by FREDERICK CHRISTOPHER, M.D.; Philadelphia: W. B. Saunders Co.; 5th edition; 1944. Price \$10.

A comparison of this up-to-date volume with the first edition which appeared in 1929, fifteen years ago, clearly reveals the result of systematic attention to all of the improvements which have occurred in each chapter of *Minor Surgery* during this period. Christopher has kept his *Minor Surgery* book regularly revised and improved as an avocation while carrying on an active surgical practice in a Chicago suburb where his clientele demands the best minor surgery as well as the best major surgery.

Open wounds and particularly the soap and water preparation of fresh, open wounds are discussed in the most modern manner with excellent illustrations, numerous quotations and an up-to-date bibliography. The chapter on Burns has been thoroughly revised and all of the modern procedures are discussed. For the benefit of interns and others interested there is an excellent chapter on preoperative and postoperative care.

The bibliography at the bottom of the pages is of interest because one finds the names of many friends and acquaintances who have in recent years either through publications or personal communications to the author, contributed useful procedures in minor surgery. It suggests that many are following the practice of forwarding their unpublished discoveries to Christopher. Tucked away in the pages of this volume are thousands of valuable morsels which will go far to uplift the general standard of surgical practice in all communities.

The Mind of the Injured Man, by JOSEPH L. FETTERMAN, M.D.; Chicago, Industrial Medicine Book Co.; 260 pages; 28 illustrations. Price \$4.

This book apparently has been written for popular rather than medical interest, since the author reverts to a rather simplified description of the nervous system and its diseases. In spite of its brevity, the author covers an amazing number of subjects within the realm of neurology and psychiatry. For lay readers this book no doubt contains many new and interesting facts; for the medical profession, it merely provides a very brief review of well known facts and principles.

News Items

The governor of North Dakota recently called a conference of professional and lay people to consider the problem of extending health services and medical care in the postwar period. In his introductory remarks the governor stated that the conference was the outgrowth of persistent demands on the part of certain individuals in the state and the series of open forum discussions held throughout the state last winter which were sponsored by farm organizations and at which Miss Elin Anderson of the Farm Foundation was the principal speaker. During the conference the secretary of the North Dakota state medical association asserted that the standard of medical care in the state is higher than in most states, and that the cooperative efforts of the state health department and the physicians in the state have produced one of the lowest rates for maternal and infant mortality in the nation. He drew attention to the large number of North Dakota physicians who are in the armed forces and to the efforts being made by the state medical association to insure the return of these practitioners to their former locations. He discussed the difficulties in obtaining physicians to settle in rural areas and suggested that the conference would do well to study ways and means of transporting patients from sparsely settled areas to established centers for diagnosis and treatment. No one speaking at the conference contended that the problem of adequate medical care in North Dakota is serious. The conference adjourned after recommending that the governor appoint a committee consisting of representatives of all interested groups, including the medical profession, to study the problem.

Dr. Leo A. Nash, X-ray specialist at St. John's Hospital, Fargo, North Dakota for three and one-half years, associated himself with Dr. Edward Schons, St. Paul on July 1st.

Dr. Irvin L. Schuchardt, formerly of Leola and Aberdeen, South Dakota has returned from overseas service with the army medical corps in the Papuan campaign in New Guinea and has reopened offices in the latter city.

Dr. Miles A. Kaa, Hamilton, Montana, has been appointed county physician for the year beginning July 1st.

Dr. A. T. Munro, Kalispell, Montana, has been appointed physician of Flathead county, in which capacity he had already been serving.

Dr. George F. Campana, formerly head of the division of preventable diseases, North Dakota state department of health, has been appointed state health officer, following the resignation of Dr. Frank J. Hill, who on June 20th, became health commissioner of Minneapolis.

Dr. F. H. Redewill, for 16 months director of the health department of Sioux Falls, S. D., has been succeeded by Dr. Emil Ericksen, at one time city health officer of Sioux Falls and for the last year assistant health director to Dr. Redewill. Dr. Redewill has accepted a position as venereal disease control officer of the Los Angeles county, California health department.

Dr. F. E. Harrington, retired Minneapolis health commissioner, assumed temporary charge of the Minneapolis general hospital as superintendent of that institution.

With the opening of the new school year, 30 days hence, the diphtheria and smallpox immunization clinics at these South Dakota points will be resumed: Dell Rapids, Baltic, Brandon, Valley Springs, Hartford and Humboldt.

Dr. E. J. Beithon, Hankinson, North Dakota, has become the president of the Hankinson Hospital Association, now forming.

Dr. Thomas C. Patterson, Lisbon, North Dakota, was honored June 14th by a parade participated in by the people whom he had brought into the world from 1897 to 1944. The various periods of Dr. Patterson's life in Lisbon were depicted by the paraders. Among the speakers of the occasion were Drs. Ralph Tainter and George H. Haynes.

Dr. John G. Lamont, superintendent of the state school at Grafton, North Dakota, attended the recent meeting of the American Association in Mental Deficiency and the American Association of Psychiatry in Philadelphia.

No less than the army, the navy and the Red Cross, the United Seamen's Service—War Shipping Administration looks after the medical needs of American merchant seamen. To welcome the repatriates just returned from the Normandy beachheads, 418 in number, arriving in New York by army transport July 7, physicians were at the pier and arrangements were made for prompt hospitalization. Dr. Daniel Blain of New York is in charge of the medical division and J. Reilly Marcus handles the division's business affairs under Dr. Blain.

(Continued on ninth page following)

Future Meetings

The University of Illinois college of medicine offers the fall didactic and clinical refresher course for specialists in otolaryngology to the number of twenty-five. Dates are September 25 to 30, the fee \$50, the address to which to write, Department of Otolaryngology, 1853 West Polk Street, Chicago 12, Illinois.

The Massachusetts Medico-Legal Society in conjunction with the medico-legal departments of Harvard, Boston University and Tufts medical schools, has arranged for a conference at Boston city hospital, Oct. 4, 1944, a part of the Harvard medical school seminar in legal medicine to occupy the week of October 2-7. Application should be made to the Harvard medical school Courses for Graduates.

The ninth annual assembly of the International College of Surgeons will be held October 3-5 inclusive, 1944, at Benjamin Franklin hotel in Philadelphia. The program will be devoted to war rehabilitation and civilian surgery.

Necrology

Dr. John Arthur Lamb, 70, city health officer of Kalispell, Montana, died June 20th, at a hospital in that city after several weeks illness. He had received a commission as captain in the medical corps in world war I and was prominent in Boy Scout and radio activities.

Dr. Julius Daniel Mueller, 39, Flandreau, South Dakota, physician and surgeon, died June 28th, enroute from Flandreau to Wentworth Park, Lake Madison. He was engaged in moving a cottage to the latter point when it tipped from the trucks. His body was crushed. He died in a hospital at Flandreau, where he had practiced for eleven years. He was a graduate of the school of medicine of the University of South Dakota.

Dr. Pierre Ulric Laberge, 83, of Ambrose, North Dakota, died at that city, July 4. He was born at Montreal where he attended medical college, removing to North Dakota at the age of twenty-six and settling near Grafton. Other points of practice were Williston, Crosby, Fortuna and Westby North Dakota.

Dr. David Powrie Maitland, 78, pioneer physician of Jackson, Minnesota, where he had practiced for a half century, died June 27 at Halloran hospital, to which city he had been taken the day before, after suffering a heart attack. He was born at Sarnia, Ontario, Canada, graduated from the medical course from the University of Michigan, was at one time associated with the Chicago Polyclinic hospital, specializing in diseases of women and children and had studied eye, ear, nose and throat at the University of Berlin. For over 20 years, he was chairman of the Jackson board of health and had served several terms as county coroner. Dr. Maitland's interests lay along the lines of travel, literature, fraternalism, and out-door sports, in all of which fields he had made friends.

Dr. James Brooks Vaughn, 76, Castlewood, South Dakota, 32 years a member of South Dakota state medical association, died at Watertown July 16. He was graduated from Missouri medical college in 1894, taking postgraduate work at New York, Berlin and Chicago. The South Dakota state board of health, at its regular session two days later passed resolutions of regret.

Dr. Jacques V. Quick, 82, Wahpeton, North Dakota, believed to be the oldest practicing physician in years of consecutive service in North Dakota, died at Fargo, July 19. He had resided in Wahpeton 55 years. Dr. Quick was a graduate of the Philadelphia college of pharmacy and Jefferson medical college, Philadelphia.

Dr. James E. Arnold, 54, in night charge of the receiving ward at General Hospital, Minneapolis, died there during the day, July 17, as he was being admitted as a patient.



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Sixty-third Annual Session
Huron, South Dakota
May 21, 22 and 23, 1944

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ANNUAL MEETING OF THE COUNCIL OF THE
SOUTH DAKOTA STATE MEDICAL
ASSOCIATION

First Session, May 21, 1944

The meeting of the council of the South Dakota state medical association was called to order by the chairman, Dr. William Duncan, Webster, on Sunday, May 21, 1944, at 2:00 P. M., at the Marvin Hughitt hotel, Huron, South Dakota.

The roll call was read by the secretary, Dr. R. G. Mayer. The following were present: President J. C. Ohlmacher, Vermillion; president-elect D. S. Baughman, Madison; vice president and chairman of council Wm. Duncan, Webster; councilors J. L. Calene, Aberdeen; H. R. Brown, Watertown; G. E. Whitson, Madison; C. E. Robbins, Pierre; W. H. Saxton, Huron; J. H. Lloyd, Mitchell; W. E. Donahoe, Sioux Falls; E. M. Stansbury, Vermillion; R. E. Jernstrom, Rapid City; R. V. Overton, Winner; C. E. Lowe, Mobridge; D. A. Gregory, Milbank; Councilor-at-large N. J. Nessa, Sioux Falls. Drs. Gilbert Cottam and A. Triolo, of the state board of health, Pierre, and Mr. Karl Goldsmith, legal advisor, Pierre, were also present.

The minutes of the council meeting held in Huron on September 11, 1943, were read and approved. The secretary read his annual report to the council. A motion was made by Dr. H. R. Brown, seconded by Dr. W. H. Saxton, and carried that the secretary's report be approved.

The treasurer's financial report was read by the secretary-treasurer, and referred to the committee of auditing and appropriations, consisting of Drs. J. H. Lloyd, J. L. Calene and H. R. Brown, for audit.

A motion was made by Dr. R. V. Overton, seconded by Dr. C. E. Lowe, and carried, that the secretary's expenses to the Chicago national economic conferences and the Denver western states conference be paid. A discussion of the North Central medical economic conference followed. A motion was made by Dr. G. E. Whitson, seconded by Dr. E. M. Stansbury, and carried, that a permanent committee, consisting of the president, president-elect and the secretary-treasurer, represent the South Dakota state medical association at future meetings of this conference with mileage expenses and \$5 per diem be paid and that the association contribute \$50 annually for expenses of holding the conference, the same amount that the other states are contributing. It was suggested that the secretary notify other members of the council of dates of this conference so that they might attend at their own expense if they desire. It was suggested that the members in the armed services be added to the active membership list.

A discussion of medical care for migratory workers followed. The secretary read a letter from the field medical officer of the United States public health service and a letter from Senator Harlan Bushfield on his amendment to the bill authorizing federal aid. Dr. Gilbert Cottam, superintendent of the state board of health, and Mr. Karl Goldsmith discussed problems regarding appointment of members of county boards of health. On motion the meeting adjourned at 4:15 P. M. to meet again at 8:00 A. M., Tuesday, May 23.

R. G. MAYER, M.D., *Secretary.*

Second Meeting of the Council
May 23, 1944

The second meeting of the councilors was called to order by the chairman, Dr. Wm. Duncan, on Tuesday morning, May 23, 1944. The roll call was read by the secretary and all councilors were present with the exception of Drs. J. C. Ohlmacher and D. A. Gregory. Mr. Karl Goldsmith, legal advisor for the state medical association, was also present. The minutes of the last meeting were read by the secretary and approved.

Discussion followed relative to the fact that no report was made by the council to the house of delegates. It was suggested that each councilor contact the delegates of his district, who will report to his district society that it was not the intention of the council to overlook making this report, but an oversight due to lack of time.

There being no old business, the chairman informed the councilors that a new chairman was to be elected for the ensuing year. A motion was made by Dr. D. S. Baughman, seconded by Dr. R. E. Jernstrom, and carried that Dr. W. E. Donahoe be nominated as chairman of the council. A motion by Dr. R. E. Jernstrom, seconded by Dr. E. M. Stansbury, that nominations be closed and the chairman cast a unanimous ballot for Dr. Donahoe, was carried and Dr. Donahoe declared elected chairman for the ensuing year. Dr. Wm. Duncan relinquished the chair to the new chairman, Dr. W. E. Donahoe, Sioux Falls.

The next order of business was discussion of the reports of the committees on medical education and hospitals and medical licensure, and the sub-committee report on tuberculosis, all of which were referred to the committee on public policy and legislation in collaboration with the legal advisor by the committee on resolutions and memorials. No formal action relative to any of the reports was taken; however, it was decided that Mr. Goldsmith was to study each one of the reports, and contact the councilors relative to any action he might advise. It was moved by Dr. Wm. Duncan, seconded by Dr. E. M. Stansbury, and carried that final action on the reports should be taken at the fall meeting of the council.

Discussion followed concerning the enabling act and its relation to the pre-payment plan for medical care. Mr. Goldsmith stated that, if a pre-payment plan was desired, an enabling act would have to be introduced and passed at the next legislative session. It was suggested that Mr. Goldsmith draw up the recommendations for the enabling act, in order that it might be introduced at the next legislative session. It was also suggested that a special committee be appointed to study pre-payment plans, and that such committee reports its findings at the fall meeting. Dr. H. R. Brown moved that such a committee be appointed. The motion was seconded by Dr. J. L. Calene and carried.

Discussion regarding various committee reports followed. Regarding the cancer control program, it was suggested by Dr. R. E. Jernstrom that the state medical association try to give the women's field army more support than has been done in the past. No formal action was taken, however, since the program cannot be organized until a chairman of the sub-committee on cancer is appointed, which appointment will be for three years, said chairman to be located in the same city or town in which the commander of the women's field army resides.

Following some discussion relative to the date of the fall meeting, it was agreed that this matter should be decided by the officers. There being no further business, the meeting was adjourned.

R. G. MAYER, M.D., *Secretary.*

Secretary's Report to the Council

Your secretary drove to Madison during June, 1943, and conferred with the outgoing secretary, Dr. C. E. Sherwood, and then took over the duties of secretary-treasurer in July, 1943.

A meeting of the officers and council was held at Huron on Saturday, September 11, 1943, and many conferences over the telephone and by mail have been had with councilors and officers of the association during the year. A mimeographed letter was sent out to all of the physicians in October and another in April.

Innumerable letters and periodicals were received from various state and component medical societies, and hundreds of letters were written in connection with routine business, of the association. Our members in congress, senators and representatives, were contacted personally and by mail on various occasions. Talks on the Wagner-Murray-Dingell Bill were made before service clubs, such as the Lions, Rotarians and Kiwanians.

I had hoped to visit most of the component societies during the year, but difficulties of transportation and press of other work prevented my making some trips which had been planned. I attended district society meetings at Mitchell, Huron and Watertown, and, of course, Aberdeen.

Numerous conferences were attended by your secretary. In August I attended a conference of medical and allied professions with senators and representatives of five states—Minnesota, Wisconsin, Iowa, and North and South Dakota, in Minneapolis. The physicians attending the conference held a pre-con-

ference meeting in the afternoon, and in the evening, Dr. A. W. Adson, of Rochester, Minn., made an address, presenting the views of the medical profession. Others spoke for the dentists, hospitals, etc. Our president, Dr. J. C. Ohlmacher, also attended this conference.

In November I attended the annual conference of secretaries and editors of constituent state medical associations at Chicago. Medical problems of economics, legislation, war and procurement, the newly-formed council of medical care and public relations, were among the subjects under discussion at this conference.

In January I attended the North Central medical conference at St. Paul, the states represented being Minnesota, Wisconsin, Iowa, Nebraska, and North and South Dakota. Others representing South Dakota at this conference were president J. C. Ohlmacher, president-elect D. S. Baughman, councilor-at-large N. J. Nessa, councilor G. E. Whitson, and our former secretary, C. E. Sherwood. Medical problems of economics, legislation, the E.M.I.C. program, etc., were discussed. Dr. L. W. Larson, Bismarck, N. D., was elected president for the ensuing year, and he appointed me as a member of the executive committee, representing South Dakota.

On February 12 I attended the mid-winter conference on pre-paid medical service in Chicago. Various prepayment plans and results were presented by men from different sections of the country. The national conference on medical service was held the following day, February 13. Numerous economic and legislative problems were discussed by men from various organizations. The Lake County (Indiana) plan, the Western States organization, the New England plan, etc., were all presented by their proponents. The outstanding address was made by Congressman Judd, of Minneapolis, Minn.

On April 28 and 29 I attended the Western States conference on the E.M.I.C. program in Denver, Colo., representatives from the medical profession being present from Colorado, Wyoming, Oregon, Washington, California, Nebraska, Indiana and South Dakota. Resolutions advocating direct allotments to wives of soldiers and sailors for maternity and infant care were presented.

The first part of May I attended the annual meeting of the Nebraska state medical association in Omaha. The officers and members of the Nebraska association were very cordial and invited me to sit with them at their meetings of the house of delegates, and much useful information regarding their methods and plans was gained. The address of Dr. A. W. Adson, of Rochester, Minn., at their annual banquet, was one of the highlights of their meeting.

The following is the analysis of the active membership by districts, showing a comparison of last year's figures at convention time, and total membership attained by the close of the fiscal year:

District	1943	1943	1944
1. Aberdeen	28	28	28
2. Watertown	19	21	18
3. Madison	20	22	18
4. Pierre	12	13	13
5. Huron	12	13	13
6. Mitchell	30	30	24
7. Sioux Falls	45	45	44
8. Yankton	29	29	24
9. Black Hills	39	45	40
10. Rosebud	6	7	5
11. Northwest	11	11	10
12. Whetstone Valley	10	10	13
Totals	259	274	250

This is a loss of 9 since last May, and 14 since December. Nine have died since last May, thirteen have moved out of the state and only seven physicians have located in the state, a net loss of fifteen. So there is no question but that the number of physicians in South Dakota is definitely decreasing; but that makes it even more important that we strive to make every eligible physician in the state an active member.

The old saying that "a chain is no stronger than its weakest link" applies to the state medical association in that the association is no stronger than its component district medical societies.

HOUSE OF DELEGATES Second Session, May 22, 1944

The second meeting of the house of delegates was called to order by the president, Dr. J. C. Ohlmacher, on May 22, 1944, at the Marvin Hughitt hotel in Huron, South Dakota.

Because of the limited amount of time, it was moved by Dr. E. M. Stansbury, seconded by Dr. J. L. Calene, that the reading of the minutes of the previous meeting be dispensed with. The motion prevailed.

Because the reports of two committees, social security and maternal and child welfare, were not presented at the first meeting of the house of delegates, they were at this time requested by the president.

Dr. W. L. Dawley, chairman of the social security committee, submitted his report, and the report of the committee on maternal and child health was submitted by Dr. W. E. Donahoe. It was moved by Dr. G. E. Whitson, seconded by Dr. J. L. Calene, that we accept the reports. The motion was carried.

The following report of the committee on nominations of officers was given by Dr. Gregory:

President-elect: William Duncan, M. D., Webster; E. M. Stansbury, M.D., Vermillion.

Vice President: F. S. Howe, M.D., Deadwood; J. C. Ohlmacher, M. D., Vermillion.

Delegate: N. J. Nessa, M.D., Sioux Falls.

Alternate: D. S. Baughman, M.D., Madison.

Councilor, First District: J. L. Calene, M.D., Aberdeen.

Councilor, Second District: H. R. Brown, M.D., Watertown.

Councilor, Fourth District: C. E. Robbins, M.D., Pierre.

Councilor, Eighth District: E. M. Stansbury, M.D., Vermillion.

The committee recommended that the time and place of the next meeting be left to the decision of the council.

Following this report, it was moved by Dr. E. M. Stansbury that his nomination to the office of president-elect be withdrawn, and that a unanimous ballot be cast for Dr. William Duncan as the ensuing president-elect. The motion was seconded by Dr. R. E. Jernstrom, and the motion was carried.

At this time, the president, Dr. J. C. Ohlmacher, requested that a motion be made to the effect that his nomination be withdrawn, and that a unanimous ballot be cast for Dr. F. S. Howe as the ensuing vice president. A motion was so made, seconded, and carried.

There being no further nominations, it was moved by Dr. E. M. Stansbury, seconded by Dr. N. J. Nessa, that the nominations be closed. The motion prevailed.

It was moved by Dr. E. M. Stansbury, seconded by Dr. J. H. Lloyd, that the remainder of the report of the nominations committee be adopted as read. The motion was carried.

An informal report of the committee on credentials was given by Dr. J. H. Lloyd. He gave the approximate number of physicians registered, which was one hundred fifteen up until noon of Monday, May 22, and stated that all district societies were well represented with the allotted number of delegates. It was moved by Dr. Lloyd, seconded by Dr. Stansbury, that the report be adopted. The motion prevailed. Final registration included 136 men and 31 ladies.

Following the report of Dr. Lloyd, the president commented on the good attendance at this meeting, expressing his appreciation to all the members, and especially to Dr. R. G. Mayer and Dr. N. J. Nessa, who were responsible for the good program which had been planned for the meeting.

The president called on Dr. Wm. H. Saxton, chairman of the committee on amendment of the constitution and by-laws, who stated that there was no report to be made.

Dr. N. J. Nessa, chairman of the committee on resolutions and memorials, reported as follows:

Medical Defense: Their committee approved the report as given by Dr. W. H. Saxton, chairman, and Dr. Nessa moved that it be adopted. The motion was seconded by Dr. D. A. Gregory and was carried.

Medical Education and Hospitals. The committee recommended that the report rendered by Dr. T. P. Ranney, chairman, be submitted to the committee on public policy and legislation in collaboration with the legal advisor and report to the council at the fall meeting. Dr. Nessa moved its adoption, motion seconded by Dr. E. M. Stansbury. The motion prevailed.

Medical Economics: The committee approved the report as rendered by Dr. Miller, and Dr. Nessa moved that it be adopted. The motion was seconded by Dr. Calene and was carried.

Public Health—Sub-Committee on Cancer: The committee approved the report as rendered by Dr. Calene, therefore moved by Dr. Nessa, seconded by Dr. D. A. Gregory, that the report be adopted. The motion was carried.

Dr. Baugman suggested that the chairman of the sub-committee on cancer be appointed for a term of three years, and that he be from the same city or town in which the state commander of the women's field army resides, therefore making it more convenient for them to work together on the cancer program. However, because at this time there had been no state commander named, it was impossible for an appointment to be made.

Public Health—Sub-Committee on Tuberculosis: The committee on resolutions and memorials recommended that the report of the sub-committee on tuberculosis be submitted to the committee on public policy and legislation in consultation with the legal advisor, and that a report be made to the council at the fall meeting. Dr. Nessa so moved on the disposition of the report. The motion was seconded by Dr. H. R. Brown, and carried.

Public Health—Sub-Committee on Mental Hygiene and Child Welfare: It was moved by Dr. Nessa that, inasmuch as his committee recommended the report of the sub-committee on mental hygiene, it be adopted. Dr. Lloyd seconded the motion, and the motion prevailed.

Public Health—Sub-Committee on Syphilis Control: The committee recommended the report on syphilis control, therefore Dr. Nessa moved that it be adopted. Dr. R. E. Jernstrom seconded the motion, and it was carried.

Necrology: The committee recommended that the report be referred back to the original committee for a complete report, and that it be published in the transactions issue of the JOURNAL-LANCET. A motion to that effect was made by Dr. Nessa, seconded by Dr. J. H. Lloyd, and the motion prevailed.

Medical Benevolence: After consideration of the report of this committee, Dr. Nessa stated that the committee recommended that the treasurer submit a check to the medical auxiliary at the rate of fifty cents per member in the organization for the year 1944, and he so moved. The motion was seconded by Dr. J. H. Lloyd and the motion was carried.

Radio Broadcast: Dr. Nessa made a motion, on recommendation of his committee, that the report be adopted, and that the committee continue to function and collaborate with the state board of health with the view of resuming broadcasts as soon as feasible. The motion was seconded by Dr. H. R. Brown. The motion was carried.

Editorial: The committee on resolutions and memorials recommended the report and it was moved by Dr. Nessa, seconded by Dr. Jernstrom, that the report as rendered by the chairman be adopted. The motion was carried.

Allied Group: The report of the allied group was approved, and therefore it was moved by Dr. Nessa, seconded by Dr. H. R. Brown that the report be adopted. The motion was carried.

Medical Licensure: The committee recommended the report on medical licensure submitted by Dr. G. W. Mills, and suggested that it be submitted to the committee on public policy and legislation for further study and to collaborate with the legal advisor before submitting the report to the council at the fall meeting. It was so moved by Dr. Nessa, seconded by Dr. J. H. Lloyd. The motion was carried.

Military Affairs: The committee accepted the report on military affairs as given, and it was moved by Dr. Nessa, seconded by Dr. J. L. Calene, that the report be adopted. The motion prevailed.

Radiology: It was moved by Dr. Nessa, seconded by Dr. J. H. Lloyd, that the report of the committee on radiology be adopted, inasmuch as the committee on resolutions and memorials so recommended. Motion carried.

Spafford Memorial Fund: The committee recommended the adoption of this report with the provision that the name of the recipient be added to the report. Dr. Nessa so moved its adoption. The motion was seconded by Dr. C. E. Sherwood. The motion was carried.

Ophthalmology and Otolaryngology: Dr. Nessa moved, on

recommendation of his committee, that the report be adopted. The motion was seconded by Dr. D. A. Gregory, and the motion prevailed.

A report of the *Committee on Reports of Officers* was submitted by Dr. G. W. Mills, chairman, and it was moved by him that the report be adopted as read. The motion was seconded and carried.

The report of the budget committee was submitted by Dr. J. H. Lloyd, chairman. Dr. Lloyd moved the adoption of this report, and it was seconded by Dr. C. E. Robbins. The motion was carried.

Following the reports of the committees, Dr. N. J. Nessa introduced a member of the board of trustees of the American Medical Association, Dr. Wm. F. Braasch of Rochester, Minnesota. Dr. Braasch addressed the house of delegates and mentioned to them the fact that the American Medical Association has been receiving a great deal of criticism during the past few years from various groups, even including members of the medical profession. He explained some of the great difficulties under which the Association is operating at this time, stating that many of its officers have gone into the service. Dr. Braasch also spoke of the committee on medical service and public relations, which has recently been organized for the purpose of attempting to bring about a closer relationship between state associations.

Dr. C. M. Wilhelmj, dean of school of medicine, Creighton University, Omaha, Nebraska, also spoke a few words on this same subject, and especially emphasized the fact that the members of the Association should be united, and in this way try to improve the Association by accomplishing many more important things and completing new, important programs.

The president made an announcement of a change of program, stating that Dr. H. E. Harvey of Lincoln, Nebraska, who was to present a paper on "Placenta Abruptio," was unable to be present, and that Mr. I. R. Vaughn, director of the division of public health education, state board of health, would substitute, and would present a film entitled, "Continuous Caudal Analgesia in Obstetrics."

Discussion followed relative to the members' appreciation to the Elks lodge and anyone else who was responsible for the splendid reception received while attending this meeting, and it was moved by Dr. Gregory, seconded by Dr. Stansbury, that the committee on resolutions and memorials prepare a statement to be presented, indicating the appreciation of the state medical association for the kind services rendered. The motion was carried.

Dr. Gilbert Cottam mentioned that at this time there is a limited supply of penicillin available for distribution among the private physicians. This penicillin may be obtained at cost upon request. The supply on hand in the state board of health is a reserve supply, to be had only by physicians who are unable to obtain it from any one of the "depot hospitals," the "depot hospitals" having been selected by the advisory panel of the office of civilian penicillin distribution, war production board, for the proper storage and distribution of penicillin for civilian medical use. Only urgent, suitable cases, can be accommodated.

There being no further business, it was moved by Dr. J. L. Calene, seconded by Dr. N. J. Nessa, that we adjourn. The motion was carried.

R. G. MAYER, M.D., *Secretary.*

REPORTS OF STANDING COMMITTEES

Committee on Medical Education and Hospitals

At this time in the year it is customary for a report to be turned in on the activities of the medical society and profession in general throughout the year.

This particular report deals with the work of medical education and hospitals in the state.

At this time I wish to thank Dr. Ohlmacher and Dr. Cottam for the information they have given me.

In regard to medical education. Medical education at the present time is limited to premedical work in most of the colleges in the state and University and a two year course in the fundamental sciences and the didactic work such as histology, pathology and anatomy and kindred subjects found in the first two years of class A medical schools. This is taught in the University at Vermillion, only.

The tentative plan for extending the work of the medical college is the recommendation of the secretary of the Association of American Medical Colleges. Namely: to give a junior year's work at some center which offers the best opportunity for clinical study and then to extend the clinical teaching under the so-called preceptor system, whereby two or possibly more students will be sent to various hospitals throughout the state for the completion of their clinical courses.

It is a sound axiom that no medical school is a real medical school, without an abundance of clinical material which can be used for teaching purposes. This needs a large city where the poor are congregated and are available for free clinics. This has been partially overcome at the University of Iowa by shipping people into the university at state expense.

It doesn't seem probable during these times that any increase in taxes would meet a friendly legislature. However, our state is young and rapidly recovering from its depression years, and when the time is ripe and a suitable plan is evolved, then the state association should get behind the plan and give it all the help possible.

Hospitals. I wrote to Dr. Cottam for information about hospitals and received the following reply and this committee agrees very heartily with this plan and endorses it.

Dear Doctor Ranney: The one matter, which I feel you will want to mention in your report on medical education and hospitals for the state medical association, is that the state board of health at present has no jurisdiction over any hospitals except maternity homes, and this constitutes a defect which Governor Sharpe and I feel should be remedied at the next session of the state legislature.

An effort to do this was made by my predecessor, Dr. J. F. D. Cook, who drew up a bill based on the one adopted and used by the Minnesota state board of health, and which was approved by our attorney general's office.

This bill did not reach a vote during the 1943 session of the legislature, but should be reintroduced at the 1945 session. In fact, I am planning to see that this is done, but I would like to have your committee back me in this, if it so sees fit, and secure, if possible, the endorsement of the house of delegates.

I enclose a copy of this bill with all corrections and additions made as suggested by the attorney general's office. I feel that it would strengthen its likelihood of passage very much if this bill can be considered by our state medical association at its coming meeting, and receive its endorsement.

If and when such a bill as this is made a law, then the state board of health can list and keep track of all hospitals in the state, and be in a position to furnish detailed information regarding each, which is impossible at the present time under existing conditions.

Very sincerely yours,
GILBERT COTTAM, M.D., Superintendent,
State Board of Health.

The following bill is the one proposed by the state board of health and the governor:

A BILL

For an Act Defining and Regulating Hospitals, Maternity Hospitals, Sanatoriums, Maternity Homes, Rest Homes, Nursing Homes, Boarding Homes and Related Institutions: to Provide for the Granting, Suspending and Revoking of Licenses Therefor: to Provide for Penalties for a Violation Thereof.

Be it enacted by the Legislature of the State of South Dakota:

Section 1: No person, partnership, association, or corporation shall establish, conduct, or maintain in the State of South Dakota any hospital, maternity hospital, sanatorium, maternity home, rest home, nursing home, boarding home or other institution for the hospitalization and/or care of human beings without first obtaining a license therefor in the manner hereinafter provided.

Hospital, sanatorium, maternity hospital or maternity home within the meaning of this act shall mean any agency which maintains accommodations for the hospitalization of the sick or injured.

Rest home, nursing home, boarding home or other related institutions within the meaning of this act, shall mean any place or building wherein persons requiring chronic or convalescent care are cared for.

Section 2: No person, partnership, association or corporation may continue to operate an existing hospital, maternity hospital, sanatorium, maternity home, rest home, nursing home, or boarding home, nor open a hospital, maternity hospital, sanatorium, rest home, nursing home, or boarding home or maternity home after June 30, 1945, unless such operation shall have been approved and regularly licensed by the State of South Dakota as hereinafter provided.

Before a license shall be issued under this act, the person applying shall submit evidence satisfactory to the State Board of Health that he is not less than twenty-one years of age and of reputable and responsible character; in the event the applicant is an association or corporation like evidence shall be submitted as to the members thereof and the persons in charge. All applicants shall, in addition, submit satisfactory evidence of their ability to comply with the minimum standards of this act and all regulations adopted thereunder.

Section 3: Any person, partnership, association or corporation desiring a license hereunder shall file with the State Board of Health a verified application containing the name of the applicant desiring said license; whether such persons so applying are twenty-one years of age; the type of institution to be operated; the location thereof; the name of the person in charge thereof. Application on behalf of a corporation or association shall be made by any two officers thereof by its managing agents.

Section 4: Each application for a license to operate a hospital, maternity hospital, sanatorium, maternity home, rest home, nursing home, or boarding home or related institution within the meaning of this act shall be accompanied by a fee to be determined by the State Board of Health, based on the number of beds available for patients thereof, but not to exceed \$1.00 per bed or such less sum as will be adequate to pay for expenses of administering and enforcing this act. No such fee shall be refunded. All licenses issued hereunder shall be renewed annually upon payment of a like fee. All fees received by the State Board of Health under the provisions of this act shall be paid into the State Treasury to the credit of the State Board of Health for the purpose of carrying out the general provisions of this act.

No license granted hereunder shall be assignable or transferable.

Section 5: Every building, institution or establishment for which a license has been issued shall be periodically inspected by a duly appointed representative of the State Board of Health under rules and regulations to be established by said State Board of Health.

No institution of any kind licensed pursuant to the provision of this act shall be required to be licensed or inspected under the laws of this state relative to hotels, restaurants, lodging houses, boarding houses and places of refreshment.

Section 6: The State Board of Health is hereby authorized to issue licenses to operate hospitals, maternity hospitals, sanatoriums, maternity homes, rest homes, nursing homes, or other related institutions as herein defined, which, after inspection are found to comply with the provisions of this act and any reasonable regulations adopted by said State Board of Health. Any person aggrieved any decision or ruling of the State Board of Health may appeal to the Circuit Court of the County in which the person appealing resides as provided in SDC Section 27.0114.

The State Board of Health is hereby authorized to suspend or revoke a license issued hereunder, on any of the following grounds:

1. Violation of any of the provisions of this Act or the rules and regulations issued pursuant thereto.
2. Permitting, aiding, or abetting the commission of any illegal act in such institution.
3. Conduct of practices detrimental to the welfare of the patient.

Provided that before any such license issued hereunder is suspended or revoked, thirty days written notice shall be given the holder thereof of the date set for hearing of the complaint. The holder of such license shall be furnished with a copy of said complaint and be entitled to be represented by legal counsel at such hearing. Such notice may be given by the State Board of Health by registered mail.

If a license is revoked as herein provided, a new application

for license may be considered by the State Board of Health, if, when, and after the conditions upon which revocation was based has been corrected and evidence of this fact has been satisfactorily furnished. A new license may then be granted after proper inspection has been made and all provisions of this act and rules and regulations hereunder as heretofore or hereinafter provided has been complied with.

Section 7: The State Board of Health shall have the power to establish reasonable standards under this act which it finds to be necessary and in the public interests and may rescind or modify such regulations from time to time as may be in the public interest, insofar as such action is not in conflict with any of the provisions of this act.

An Advisory Board of five members shall be appointed in the following manner to make recommendations to the State Board of Health and to assist in the establishment of such standards and any amendments thereto. This Board shall consist of three members to be appointed annually from the membership of the South Dakota Hospital Association by the Board of Trustees thereof and two members shall be doctors of medicine to be appointed annually from the South Dakota state medical association by the Council of the South Dakota state medical association. Provided, however, that no regulation nor requirement shall be made, nor standard established under this Act for any sanatorium, nursing home, nor rest home conducted in accordance with the practice and principle of the body known as the Church of Christ, Scientist, except as the sanitary and safe condition of the premises, cleanliness of operation, and its physical equipment.

Section 8: Information received by the State Board of Health through inspections and authorized under this act shall be confidential and shall not be disclosed except in a proceeding involving the question of licensure.

Section 9: Any person, partnership, association or corporation establishing, conducting, managing, or operating any hospital, maternity hospital, sanatorium, rest home, maternity home, nursing home, or institution within the meaning of this act, without first obtaining a license therefor as herein provided, or who shall violate any of the provisions of this act or regulations thereunder, shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not to exceed \$100 or a sentence of not to exceed 90 days in the county jail.

Section 10: Chapter 27.12 is hereby repealed.

HOSPITAL SECTION OF REPORT

The following hospitals are listed as members of the state hospital association and are classified as to their capacity, type of service, control and ownership.

SOUTH DAKOTA				
Name of Hospital and Location	Capacity	Type	Control	Ownership
ABERDEEN St. Luke's Hospital	165	General	Sisters	Church
DFADWOOD St. Joseph's Hospital	62	General	Sisters	Church
HOT SPRINGS Veterans Adm. Hosp.	281	General	Veterans Admin.	Federal
HURON Sprague Hospital	59	General	Directors	Private
LEAD Homestake Hospital	30	Industrial	Chief Surgeon	Corporation
MADISON Madison Comm. Hosp.	72	General	Trustees	Community
MILBANK St. Bernard Prov. Hosp.	38	General	Sisters	Church
MITCHELL Methodist State Hosp.	115	General	Trustees	Church
	138	General	Sisters	Church
PIERRE St. Mary's Hospital	120	General	Sisters	Church
RAPID CITY Black Hills Gen. Hosp.	62	General	Trustees	Church
	125	General	Sisters	Church
	130	Tuberc.	Dept. of Interior	Federal
ROSEBUD Rosebud Indian Hosp.	47	General	Dept. of Interior	Federal

SANATOR S. D. State Sanatorium for Tuberculosis	192	Tuberc.	Board of Health	State
SIoux FALLS McKenna Hospital	148	General	Sisters	Church
Sioux Valley Hospital	163	General	Trustees	Community
WATERTOWN Bartron Hospital	77	General	Owner	Private
Luther Hospital	77	General	Directors	Church
WEBSTER Peabody Hospital	58	General	Owner	Private
YANKTON Sacred Heart Hospital	196	General	Sisters	Church

In addition to these, there are numerous private and civily owned hospitals, some of which are very excellent institutions and some of which are very poor. This proposed bill would give the board of health control of a bad situation and allow them to terminate a hospital license if not properly and ethically conducted. This committee endorses this bill.

T. P. RANNEY, M.D.
R. A. BUCHANAN, M.D.

Committee on Medical Defense

The committee on medical defense desires to submit the following report: A survey shows that again this past year there has been no major suit for malpractice in this state. As to how many were settled out of court, it is impossible to state; however, the above shows a very satisfactory, healthy and contented condition of our citizenry and that they are not at present looking for easy money through the doctor or his carrier.

However, the threat does continually exist, and we should always be on the alert to have recognized and reputable carriers, and still more important, remember our medical ethics.

This committee does feel, however, that the attention of the society as a whole and in its component county societies should be brought to the Murray-Wagner-Dingell Bill No. 1161 and that as a society, we should go on record as opposing this very dangerous Act; that we should act not only through our legislators in Washington, but also at home through the press and individual contacts.

Respectfully submitted,
W. H. SAXTON, M.D., *Chairman*.
T. F. RIGGS, M.D.
C. J. McDONALD, M.D.

Committee on Economics

The economic committee submits the following report for the year:

There have been no particular economic problems that have come to our attention during the year. We wish, however, to call to the attention of all the members of the society the Murray-Wagner-Dingell Bill which is before congress. I think that you have all had literature on your desk concerning this socialized medicine problem. We have thought that every member of the society should call to the attention of the public in his community, the dangers of this bill. To let the public know that we are not against any locally organized and established hospital or medical insurance, but that we do object to the government handling the practice of medicine. This means that the politicians will be in complete control of the practice of medicine, and use it for political gains. Be sure and distinguish between socialized medicine and that which we have in our colleges, industries and hospital insurance which are run independent of any government agency.

HAROLD A. MILLER, M.D., *Chairman*.
C. E. ROBBINS, M.D.
D. A. GREGORY, M.D.

Committee on Public Health

To: R. G. Mayer, M.D., Secretary-Treasurer South Dakota State Medical Association.

The Sub-Committee on the Syphilis Control Program reports as follows:

To: A. Triolo, M.D., Chairman Committee on Public Health, South Dakota State Medical Association.

As chairman of the sub-committee on syphilis control program, United States Public Health Service, of your committee on public health of the South Dakota state medical association, I beg to advise you that the chemical control program, as administered by the South Dakota State Board of Health, has

been conducted during the past year on the lines previously set forth with the one exception that we have deemed it advisable to discontinue the issue of tryparsamide and similar arsenicals used in the treatment of tertiary syphilis, as we believe that this is purely the function of the private practitioner in the treatment of this disease, and such treatment has no part in the program of preventable spread of the disease.

Our treatment centers at Sioux Falls and Rapid City continue to function satisfactorily, but more especially in the field of gonorrhea, although there have been a few cases of Wassermann-fast syphilis under treatment. The facilities of these two centers can be made available to suitable patients from elsewhere in the state, if authorization is received from the State Board of Health.

We are now in position to secure limited amounts of penicillin, but thus far have confined its use to the treatment of sulfa-resistant gonorrhea. However, in view of the fact that there is a possibility of its usefulness in the treatment of Wassermann-fast syphilis, we are bearing this in mind, and, if circumstances warrant, we shall, in the future, consider its practicability in that connection.

Very sincerely yours,

GILBERT COTTAM, M.D.,
Supt. State Board of Health.

The Sub-Committee on Cancer reports as follows:

To: A. Triolo, M.D., Chairman Committee on Public Health, South Dakota State Medical Association.

As a member of the sub-committee on cancer of the committee on public health, I beg to report that during 1943 and 1944, we have continued in the State Board of Health, a campaign of education in all matters of interest concerning cancer through our Division of Public Health Education, and our monthly bulletin, *Health Highlights*, under the editorship of Mr. I. R. Vaughn, Director.

We have endorsed, and supported by letters, etc., the efforts of the Women's Field Army. A fund of two hundred dollars (200.00) was appropriated a year ago for the examination of tissue specimens from indigent patients by accredited pathologists. We shall continue similar efforts in the future.

Very sincerely yours,

GILBERT COTTAM, M.D.,
Supt. State Board of Health.

No report has been made by the sub-committee on tuberculosis or the sub-committee on mental hygiene and child welfare.

I should like to make a few comments regarding tuberculosis in South Dakota and the control problems with which we are confronted:

1. Admission to the State Sanitarium for Tuberculosis requires two years residency in the state. Several instances have arisen in which admission to the sanitarium has been denied because of the failure of the applicant to qualify under the residence requirement. This has created a hardship not only for the applicant in that adequate treatment has been denied the patient, but it also has created a problem of control in that the patient has remained in his home community to spread his disease among those with whom he has contact.

If tuberculosis control is to become successful, the barrier of the residency requirement to the state sanitarium should be removed.

2. A successful tuberculosis control program includes early diagnosis and treatment. The family physician is the first link in the control chain. We definitely know that the usual office examination is not adequate for finding early tuberculosis. Every physician should, therefore, avail himself of the advantages of the tuberculin test for finding the early case of tuberculosis. Tuberculin testing should be a part of every routine physical examination, to be followed by routine x-rays of positive reactors to determine whether the infection is active. Every known tuberculosis contact should be encouraged by the physician to submit to tuberculin testing and follow-up x-ray of positive reactors.

3. The incidence of tuberculosis has always increased during or following war. It is felt that the present conflict will result in an increase in the incidence of tuberculosis. Already many soldiers are being returned home with active tuberculosis. Many of them do not realize the seriousness of their infection nor do their families, friends and the community. It is the function

and duty of every physician to counsel and advise these patients on the importance of treatment and methods of protecting others.

The home treatment of tuberculosis is usually not successful from either the standpoint of treatment or control. Therefore, the physicians should urge sanitarium treatment for their tuberculosis patients.

Concerning mental hygiene, I would like to make the following comments:

A large number of the casualties of the present war are due to war neurosis and psychosis. Every community in the state will no doubt have its share of such casualties return to their home community and attempt to make a readjustment. The physician should therefore be prepared to give these mentally ill patients guidance and treatment in order to help rehabilitate them.

In South Dakota we have no program of mental hygiene. A nucleus for the development of a program has developed as a result of the appointment by Governor M. Q. Sharpe of a committee on mental hygiene. This committee consists of Dr. Gilbert Cottam, Dr. F. W. Nessa, and Dr. F. V. Willhite. The appointment of this committee was made in order that the state might avail itself of the benefits of the Barden Act, which provides for grants-in-aid to the states for development of a mental hygiene program for the rehabilitation of war veterans.

I would urge that the South Dakota State medical association lend its support to the development of this program in order that eventually a state-wide program of preventive mental hygiene may be developed.

Respectfully submitted,
A. TRIOLO, M.D., *Chairman*
Committee of Public Health.

Committee on Cancer:

Because of the tremendous burdens and overwork resulting from the scarcity of physicians during the war, it was felt that it would not be proper this year to add more work to the already overtaxed members of the profession.

The cancer committee in past years has done very little actually to aid the work of the Women's Field Army for the Control of Cancer. This has been due to the fact mainly that this work was not well organized in South Dakota. It was thought that this year steps would be taken in the direction of organization. In fact, Mrs. G. E. Stoddard of Wisconsin, regional deputy commander of the women's field army, came to South Dakota in March, 1944, to help further organize the work. She interviewed the South Dakota state commander, Mrs. A. T. Tollefs, of Sioux Falls, Dr. Ohlmacher, Dr. Baughman, Dr. Cottam, and myself as chairman of the sub-committee on cancer. Plans were made to help in organization of the work in the state. However, the resignation of the state commander upset these plans. To date, no one has been appointed to take her place.

A number of suggestions were made by Mrs. Stoddard, which the chairman of the committee on cancer recommends. They are as follows:

(1) That the chairman of the state cancer committee of the South Dakota state medical association be appointed for a term of three years. (Under the present system, the chairman does not become familiar with the work at all until the end of his one year as chairman.)

(2) That the chairman be someone located in or near the city of the state commander of the Women's Field Army, so that he can properly cooperate with her in the organization of her work.

(3) That the state commander of the Women's Field Army be invited to attend the annual state association meetings so that she can personally contact members of the society, and particularly members of the state committee, about the work planned for the next year. Also that she be given a place on the program if she so desires.

(4) That plans be now made by the state committee to help further develop cancer clinics over the state, and especially to help secure after the war recognized pathologists to head or supervise these clinics, as is required by the Women's Field Army, if they are to be recognized as official cancer clinics. (In the meantime, while pathologists are not available, encouragement should be given to the unofficial groups who are now con-

ducting such clinics as best they can in some of the hospitals over the state.)

(5) That the South Dakota state medical association itself go on record as willing to help further the work of the Women's Field Army and if possible do something in a financial way to help carry on this work.

JOHN L. CALENE, M.D., *Chairman*
Sub-Committee on Cancer.
O. S. RANDALL, M.D.
R. E. JERNSTROM, M.D.
GILBERT COTTAM, M.D.

Committee on Necrology

The following members of the South Dakota State Medical Association have passed away since the previous report last May:

Name	Date of Death	Address
Tillisch, Henrik	June 20, 1943	Brookings
Jones, E. W.	July 5, 1943	Mitchell
Gifford, A. J.	Sept. 14, 1943	Alexandria
Johnson, A. E.	Dec. 30, 1943	Watertown
Madsen, M. L.	Jan. 8, 1944	Canova
Engelson, Christian J.	Jan. 18, 1944	Brookings
Carmack, Albert O.	Feb. 22, 1944	Colome
Stone, J. F.	March 31, 1944	Montrose
Curtis, J. E.	May 7, 1944	Lemmon
Gilbert, Geo. F.	Nov. 14, 1944	Rapid City
Kouffman, E. J.	May 1, 1944	Marion

R. V. OVERTON, M.D.

REPORTS OF SPECIAL COMMITTEES

Committee on Military Affairs

Sixty physicians of South Dakota are or have been in the Armed Services. Two of these have received medical discharges and have returned to practice. Only one of these men, Dr. J. E. Studenberg, Gregory, has been commissioned since our last meeting a year ago.

WILLIAM DUNCAN, M.D.
D. A. GREGORY, M.D.
H. T. KENNEY, M.D.

Radio Committee

This report should probably be given by another committee—namely that on necrology:

It was with deep regret that the radio broadcasts had to be stopped in July, 1943, because of lack of material. This committee had real work to do in the procurement of papers and material for its weekly broadcast and due to the conscientious, unselfish service of Dr. Hohf of Yankton and later Dr. Hummer of Sioux Falls, no Sunday reading was ever missed. The local broadcasting station considered the state medical Sunday broadcast the best of all its good-will programs and the manager recently reported that they had received special commendation for it in their N.B.C. meeting in Chicago. The program was discontinued because there just were not any papers obtainable and the committee and its reader feel that the door has been left open for the resumption of the program at any time in the future—with the hope that it will be soon.

W. E. DONAHOE, M.D.
S. M. HOHF, M.D.
R. E. JERNSTROM, M.D.

Editorial Committee

The Editorial Committee begs to report that the JOURNAL-LANCET continues to serve our society's publication requirements with efficiency and satisfaction. We do feel, however, that the services of the JOURNAL-LANCET are not taken advantage of to the fullest extent and would therefore advocate that secretaries of the state component societies send to the editor of the JOURNAL-LANCET any monthly news items of interest to our members in general, as often as such items become available.

Medical papers by our members, which are read at various society meetings, should also be submitted to the JOURNAL-LANCET, as well as any article which any member desires to submit individually, which carries a medical message.

Our society also has accumulated a series of radio talks which have been broadcast in the past, and, inasmuch as many of our members have very likely been unable to listen in on the broadcasts to hear the articles, which have been well prepared and cover the medical field with thoroughness and efficiency, we ad-

vocate publication of these selected or revised articles from time to time as the editor sees fit to publish them.

N. J. NESSA, M.D., *Chairman.*

Radiological Committee

The Committee on Radiology begs to report that as far as we know the science of radiology carries on with professional ability and humanitarian service throughout the state. The war situation has brought about some difficulty in securing equipment and supplies; but gradually these restrictions are being released and as time goes on, this very helpful diagnostic and therapeutic aid becomes more and more available and helpful to medical science.

Radiology as a recognized and highly respected specialty in medicine is definitely opposed to hospital and insurance plans to furnish this service *without* medical control and supervision and thereby retain the practice of medicine with trained medical skill and not with lay groups, politicians and corporations.

Respectfully submitted,

N. J. NESSA, M.D., *Chairman.*

Women's Auxiliary of the South Dakota Medical Association

The Women's Auxiliary has been active during this year. Several meetings have been held by the officers in various parts of the state. There are nine organized districts, all of which have been active.

Besides the regular meetings held in the various districts, the president, Mrs. J. C. Hagin, has carried on considerable correspondence with the officers of the districts encouraging them to keep up their interest in the various projects that the organization has sponsored.

The chief activities during the year have been the encouragement and assistance in securing cadet nurses, registration of graduate nurses, promotion of health and nutrition. Mrs. G. S. Backman, chairman of the benevolent fund, reports that there is \$1,239.50 in this fund, most of which is invested in Series F United States Bonds.

The Women's Auxiliary is to be commended for their efforts and success in maintaining interest and a good membership with nine of the twelve districts of the state society active.

Respectfully submitted,

J. C. SHIRLEY, M.D., *Chairman.*

Committee on Ophthalmology and Otolaryngology

As you know the committee on ophthalmology and otolaryngology is listed as an advisory committee to the State Board of Health. Regular meetings are not held although individual members are consulted with regard to inter-society relationships and policy. The South Dakota academy of ophthalmology and otolaryngology meets in a special session at the time of the state meeting, and its individual members help support and foster the welfare of the state medical society. At the last meeting, Dr. A. Triolo reported for this advisory committee.

J. B. GREGG, M.D.

Social Security Committee

The Committee consists of Dr. Smith, Yankton, Dr. Buchanan, Huron, and myself; has had no formal meeting and has been remarkably inert.

We realize that social security has many potential ramifications, some of which will of necessity be embodied in reports of other committees; namely, medical economics committee, public policy, and medical benevolence.

Various plans for prepayment and the medical insurance as related to professional fees have been proposed by various agencies. Likewise, plans leading to out and out political control of medical practice have been brought to the attention of the profession.

This committee suggests that agencies be set up to study these plans recognizing the inevitability of a change from the past status of medical practice, and with a view of selecting or formulating a plan which we can support. We endorse a plan whereby control is retained by medicine and not by federal agencies—by doctors and not by politicians.

W. A. DAWLEY, M.D.

Maternal and Child Welfare Committee

This committee has done nothing the past year and long, stereotyped, annual reports under such conditions always seemed like "much ado about nothing."

There is no doubt that this is a committee through which the

state association should be most active because it is in this field that the various agencies of social or centralized medicine have driven its entering wedge—and nicely so in South Dakota. Just such an instance is the Emergency Maternity and Infant Care program as directed by the Children's Bureau out of Washington. Whatever consideration is shown the private physicians in South Dakota is the will of the administrators of the program in the State Board of Health and not because of any collaboration with the physicians of the state through their representative committee.

Another instance is the "traffic in children," the practice of medicine, if you please, fostered by the State Board of Health from Washington through local departments done solely because of its great propaganda potentiality and public appeal—and a fine smoke screen to the medical profession who really undervalue proper child care. In Sioux Falls the Health Department is devoting most of its energy to carrying on practically a free service to all children, rich and poor alike, and making much of it through publicity, instead of directing its chief efforts along public health lines in the way of health-education and public sanitation. There is an unbelievable amount of money available and there should be power to enforce better public health standards but the public food supplies and waste disposal in the city have not been advanced one iota. To repeat: it does seem that there is much that could be done by this committee if the state association has the will to protect and advance the interests of the physicians of the state.

W. E. DONAHOE, M.D.

E. T. LIETZKE, M.D.

J. E. STUDENBERG, M.D.

Committee on Medical Licensure

The committee submits the following report: Medical Licensure is so indefinite in its scope and so varied in its relationships that practically every aspect of the practice of medicine, scientific, economic, sociological, and political are involved.

If then, this report seems to invade the field more properly belonging to some other committee, our apology is that the incidental relationship is so important to the main context that it cannot be here ignored.

We all realize that the practice of our profession, as we have known it, is being threatened from outside our ranks. It might be well for us to make an inquiry to see if we within the ranks aren't somewhat to blame for the predicament we are in. Much thought has been given to this aspect of the question over the past few years, and some of the conclusions are here presented.

We have said "The relationship that exists between the patient and his physician is confidential and based on *mutual* trust and confidence." We have said that this relationship must not be destroyed. However, when someone has come along with a scheme to socialize our profession the "bait" has invariably been money, that someone is ready to hand to us the minute service is rendered. Have we trusted our patient? We have *not*.—Witness our sorry experience with the F.A.C. and the present maternity program for soldiers' wives. Because of the promise of a pot of ready money, we have acquiesced to programs that should have been subjected to a great deal of investigation and deliberation.

We have said in effect by our actions that our "professional services" are a commodity that can be bought and sold and re-sold by any broker who wants to engage in the business. We have said in effect that the broker may adulterate that commodity, sell it for a profit, or ration it out to suffering humanity as he sees fit.

We have permitted that third party to make regulations as to how we must treat our patients, and how much treatment the patient may have. We have abandoned intelligence for subservience and regimentation, all because we have not trusted our patient to pay us if he had the money in his own hands.

Group health plans, pre-payment plans for medical care and the other schemes suggested that are threatening to socialize our profession need not be allowed to do so. They are essentially insurance plans and the indemnity should be paid to the member and he be the only one to deal with his doctor or hospital, thus leaving the relationship between the patient and his doctor free of interference by a third party.

In the absence of clear legal defining of the values of this relationship, our own supreme court in a recent decision has

stated principles to which we can profitably give our consideration. I quote from that decision:

"The most cursory analysis of the medical practice act reveals that it was motivated by a purpose to bring a high standard of character and competence to the diagnosis and treatment of human ailments and to prevent the quack and the unfit from ministering unto the ills of mankind. To accomplish these purposes a system of licensure was set up, based on personal qualifications including age, character, schooling, training and professional conduct, and a penal provision was added to the act to deter the unfit from treating patients. It will be further noted that throughout the act, the legislature has dealt with the functions of natural persons and has ignored their legal relationships. Although the act, by the power it grants, in sections 7710 and 7711, *ibid.*, to revoke a license to practice, seeks to regulate the practice of licentiates by stating as a cause for revocation 'unprofessional conduct' and enumerating certain types of conduct, practice for gain as the employee of an unlicensed individual or corporation. The conclusion seemed irresistible to the court that by the medical practice act the legislature intended to prevent unlicensed persons from the actual diagnosis and treatment of human ills but did not intend to prevent unlicensed persons from engaging in the business of supplying the services of licensed practitioners."

I quote later in the same: "Public Policy, said the court, is the principle of law which holds that no person can lawfully do that which has a tendency to be injurious to the public or to be against the public good. 17 C.J.S. 563. When conduct opposed to the public interest is made the subject of a bargain, the courts ordinarily refuse to accord a party thereto a remedy predicated thereon. Restatement, Law of Contracts, sec. 598. The subject of the practice of the learned professions by a corporation has been under consideration by the courts in a variety of actions and proceedings involving the practice of law, dentistry, and medicine. While decision has rarely turned on the naked issue of public policy, those courts, by dictum at least, indicate a current of opinion, to which there are but few dissentients, that the corporate practice of the learned professions contravenes the public interest and is contrary to public policy. After discussing the variety of reasons assigned therefore, the court concluded that the corporate practice of any of the learned professions of law, medicine or dentistry would tend to debase those professions and that corporate practice would have a tendency to blight the character or lower the standards of professional practice and would be in contravention to the public aspirations so clearly reflected in the licensing statutes, which with their emphasis on character and professional conduct on the part of licentiates, evidence a fixed public desire not only to foster but to develop and reinforce the basic attributes of the professional servants of the public. The court was of the opinion that the practice of the learned professions by a corporation organized for profit, even though it functioned through duly licensed physician employees, tended to debase the profession and consequently was in contravention of the public interest and was against public policy."

So, to more clearly define and to protect that physician-patient relationship and to keep it on a basis that will preserve mutual trust and confidence, we recommend the following:

1. The practice of medicine, or furnishing of medical services for which a charge is made by any person, corporation, association, or any other agency, not licensed to practice medicine be prohibited by law, and that anyone so practicing may be restrained by temporary and permanent injunction.

2. That practice under any name other than the name of the individual licensed be prohibited, and

3. That the signing of any "closed shop" agreement by a physician in South Dakota be defined in law as "unprofessional conduct" and that such agreement or contract be declared against public policy and therefore null and void.

Respectfully submitted,

G. W. MILLS, M.D., *Chairman.*

Committee on Resolutions and Memorials

Our Committee on Resolutions and Memorials begs to report as follows:

Medical Defense: Our committee begs to report its approval of this report as given by Dr. W. H. Saxton.

Medical Education and Hospitals: Our committee begs to report that the report rendered by Dr. Ranney be submitted to

the committee on public policy and legislation in collaboration with the legal advisor and report to the council at the fall meeting.

Medical Economics: Our committee approves the report as rendered by Dr. Miller and recommends its adoption.

Public Health: Sub-Committee on Cancer: Our committee approves the report as rendered by Dr. Calene and recommends its adoption. — Sub-Committee on Tuberculosis: Our committee recommends that the report be submitted to the committee on public policy and legislation in consultation with our legal advisor, and report to the council at the fall meeting. — Sub-Committee on Mental Hygiene and Child Welfare: Our committee recommends that this report be accepted and recommended for adoption. — Sub-Committee on Syphilis Control: Report recommended for adoption.

Necrology: Our committee refers the report back to the original committee for a complete report so that it may be published in the July issue of the JOURNAL-LANCET.

Medical Benevolence: Our committee recommends that the treasurer submit a check to the medical auxiliary at the rate of fifty cents, (\$00.50) per member of our organization for the year 1944.

Radio Broadcast: Our committee recommends that the committee on radio broadcast shall continue to function and collaborate with the State Board of Health with a view of resuming broadcasts as soon as feasible.

Editorial: Our committee approves the report as rendered and recommends its adoption.

Allied Group: Our committee approves the report as given and recommends its adoption.

Medical Licensure: The committee recommends the report submitted by Dr. Mills, and suggests that it be submitted to the committee on public policy and legislation for further study and to collaborate with our legal advisor before submitting the report to the council at the fall meeting.

Military Affairs: Our committee accepts the report as given and recommends its adoption.

Radiology: Our committee accepts the report as given and recommends its adoption.

Spafford Memorial Fund: Our committee accepts the report as given and recommends its adoption.

Ophthalmology and Otolaryngology: Our committee accepts the report as given and recommends its adoption.

Social Security: Our committee recommends that Dr. Dawley or his substitute chairman of the committee read his report at the present meeting.

Maternal and Child Welfare: Our committee recommends that the report rendered by Dr. W. E. Donahoe be read for this body at this time.

N. J. NESSA, M.D., *Chairman.*
JOHN L. CALENE, M.D.
D. S. BAUGHMAN, M.D.

Committee on Auditing and Appropriations

Vouchers, checks, bank books, including remittances from the various district societies, and disbursements and all records found in order and the books balanced.

ESTIMATED BUDGET—1944-45

Estimated Income	\$3,900.00	
Estimated Disbursements:		
Retainer, attorney	\$ 300.00	
Secretary's salary	600.00	
JOURNAL-LANCET, subscriptions	600.00	
Stationery, printing, mimeographing, etc.	140.00	
Bond, secretary-treasurer	10.00	
Council meeting	250.00	
Social security tax	6.00	
Speakers expenses	800.00	
Programs	50.00	
Benevolent fund	125.00	
Legislative fund	500.00	
Miscellaneous	244.00	
Total	\$3,625.00	3,625.00
Estimated Balance		\$275.00

J. H. LLOYD, M.D.
J. L. CALENE, M.D.
H. R. BROWN, M.D.

ADDRESS OF THE PRESIDENT

J. C. Ohlmacher, M.D.
Vermillion, South Dakota

Previous to the completion of this program I had written our worthy secretary and suggested that the reading of the president's address be omitted. He replied that the by-laws of our association required this formality. So regardless of your reaction I shall subscribe to an accepted procedure.

If you will bear with me, I shall present a few ideas concerning which I have given some thought through the course of many years, all of which fit into the confused picture of the present. As most of the years since my graduation have been devoted to medical education and public health administration, some of my observations may be considered of the "side line" variety. It frequently happens that the fellow on the outside looking in gets a somewhat truer perspective of things than the fellow on the inside looking out. Thus it happens that through the twenty-four years I have been in South Dakota, I have learned to know intimately many of the practicing physicians of the state and have had presented to me their viewpoints concerning those things which bob up now and then to disturb, to a greater or less degree, their equanimity; factors that disturb because they threaten the welfare of their profession, or imply encroachment in the fields of their activity. Also being on the side line as a medical educator and as an agent of the public health board, I am brought into contact with lay and public health interests. From each source I get viewpoints concerning the duties, obligations and functions of the medical profession within the scheme of social betterment. This brief thesis is, therefore, largely predicated on the cross section ideas developed in this manner. Not all of them, possibly none of them, may appeal to you, and, as a matter of fact, some of my medical brethren may resent their implications.

When I graduated in medicine the horse and buggy doctor was still in existence. At that time, few of the men in practice knew much about scientific medicine, because their exposure to didactic instruction and "bull pen" clinics offered little to awaken or foster scientific enthusiasm. What was offered was largely concerned with the "art of medical practice" and what was stressed by many of the instructors was the obligation of the medical man to society in which "service to mankind" loomed large. The old timer, a term employed in reverence to his memory, seldom missed a call from any one in distress who sought his services, and he seldom or never concerned himself primarily with the ability or lack of ability of such a one to pay for services rendered. He worked hard, day and night, through all kinds of weather conditions and often without the advantage of hospital facilities. He seldom acquired much of the world's goods; he usually had more "on the books" than he ever collected. His greatest reward was the confidence, the admiration and the almost reverent regard of his fellow men. In those days one did not hear of threats of socialized, politically controlled medicine. The medical profession was generally glorified; the medical practitioner

was regarded by many as a superior humanitarian.

With the rapid advance of scientific medicine, with increased requirements in premedical and medical education, a new era arose in which, among other things, the cost of medical education outstripped the added years of instruction. The application of advanced medical knowledge to treatment and diagnosis, required much additional equipment and increased trained technical personnel in the private offices, in the clinics (which now arose in numbers), and in the hospitals of the country. This increased the financial load all along the line. As a necessary corollary of this greatly increased cost of medical education and practice, the private patient had to shoulder the load. Just what influence these factors had is somewhat speculative—but the fact is evident that many physicians adopted the business practices, if not the acumen, of the successful tradesman, the banker, and the lawyer. Commercialism arose all along the line; competition became strong; cults and illegal practitioners increasingly developed and waxed strong largely because they offered so-called medical care on a cheaper basis than the real physician could afford.

Barriers, in an attempt to protect the public against charlatans and quacks, were erected; the American Medical Association was dubbed a trust and the American physician a tradesman. Also, in this readjustment, some of the most sacred ideals of the profession, such as "service above self", appeared to be relegated into the background. Indigents continued to be given reasonably good care through various governmental agencies and charitable organizations; the rich and the near rich could afford to pay the greatly increased cost of medical care, but the kicked-around, intelligent, low salaried white-collar citizen was caught behind the eight ball. When any member of his family became sick and was hospitalized for a considerable length of time, the bill grew to what appeared to him, enormous and unreasonable proportions. He, being a respected citizen in his community, could not afford to abrogate the debt, so he usually dug into the meager savings of many years, or if necessary, he mortgaged his property to the extent of the debt to the hospital and physician, or he made arrangements with his physician to pay something each week or month. Anyway, his dreams of saving enough to properly educate his children and care for old age were thus often shattered. Under such stress he became easily influenced by the wiles of the political charlatan who offered a glimpse of utopia through subjection of the medical profession—said to be "wholly to blame for his unfortunate state"—to political, bureaucratic control. Too often such as he, in the belief that they were getting the worst of it, have been thus influenced, until today they constitute one of the strongest forces in support of measures to put the practice of medicine on a socialized basis. These are the type of citizens we must appease. These are the citizens whom we must keep chiefly in mind in the development of any program which will provide efficient medical care

to all. They now constitute a definite, strong factor in aiding or harming the medical profession.

This rather lengthy preamble leads to a proposal and a warning. Until we as individuals and as representatives of organized medicine can, by our acts, convince the majority of the laity that we really have, above all else, their welfare in mind, we shall continue to face the threat of such measures as has been proposed in the Wagner-Murray-Dingell bill. If, in this state and elsewhere in the Nation, we do not quickly perfect means whereby everyone may receive the best of medical care on a well planned, workable, small payment basis, keeping particularly in mind, of course, the many receiving inadequate salaries, we shall be forced to submit to the degradation of bureaucratic, political control and all that it implies to our whole social structure. It is up to us in South Dakota to get solidly back of any good, workable scheme that offers a solution, and give it all the moral and material support within our power. We must meet this challenge; we must control our destinies, or lose our identity as an independent, strong agency capable of helping in mapping the route to greater progress and greater health and happiness of our people. I shall repeat: unless we as individuals and as a medical organization set up and control all agencies having to do with the physical welfare of our citizens, others less capable, less able to understand the necessity of definite integration of all interests working toward a common goal of better and better health for our nation will take over. Unless we assume and maintain control of these things—the integrity of our great profession will continue to be assailed and will eventually crumble. Of course those of us sitting on the side lines, as it were, may have a different viewpoint of these things from those engaged in competitive practice.

When an individual is permitted to enter the medical profession he is supposed to assume obligations, chief of which is "service." First and foremost the physician should assume all the obligations of a *good citizen*. Neither his chief function nor his highest obligation is that of administering to the sick. Transcending this is an obligation and special privilege—that of assisting in every way to prevent sickness. As individual doctors, and as medical organizations we must give full cooperation to all those worthy, medically controlled agencies established and operated in the interests of public health. Unfortunately, in the past and to a considerable extent today, members of the medical profession have, for one reason or another, failed to sense and exercise their responsibility in the development and fostering of public health programs. In South Dakota, perhaps to a greater extent than is evident in any of our neighboring states, this lack of cooperation has been and continues to be evident. To the earlier lack of wide acceptance of this responsibility by medical men can largely be attributed the development of many lay organizations illy prepared to administer to the health needs of the public. Poorly directed activities of such organizations signally failed to accomplish their purpose, and their willful or ignorant assumption of many of the prerogatives of the profession resulted in widespread resentment in medical ranks. Thus

previously existing lack of cooperation on the part of the medical profession with medical and lay organizations of public health became increasingly evident. It remained for a few wise, far-seeing individuals in the medical profession and among lay social workers to bring adjustments which finally have received wider acceptance. The result is that health control or preventive medicine is coming into its own in this country. Some of the rancor, some of the suspicions still remain in the minds of many physicians, and this in part, accounts for the lack of complete acceptance of some very worthy health programs, the full success of which is so largely dependent upon their full cooperation.

Thus, in South Dakota, one of the most worthy programs to which all medical men could, without hesitancy, fully subscribe, has, to date, met with practically no success and bids fare to die of inertia. I refer to the program for the control of cancer. Our state association in conformity with the action of many of the state medical societies throughout this country subscribed to the program by appointing a subcommittee on cancer control. This committee is supposed to cooperate with and have control of the Women's Field Army for the Control of Cancer in this state. Throughout the years since our association subscribed to this program, but desultory efforts were made to further its objectives. Our association continued to pass one resolution after another in support of the Woman's Field Army and its state commander, but no concrete, constructive effort of support was forthcoming. As has usually been the case, a few of our members—as they have done in furtherance of other worthy objectives—have given fully of their time and energies to this program. The great majority, for some reason or other, have failed in their support. As a result, the Women's Field Army has about given up the ghost for lack of moral and financial support.

The Women's Field Army for the Control of Cancer is an outgrowth of a movement sponsored by the American Society for the Control of Cancer, the membership of which largely consists of outstanding medical authorities, and by the American Medical Association. Now practically every medical organization in the country has, in one way or another, approved the program. It is a sad commentary on our own state society and its members that no worthwhile progress has been made here. Minnesota, North Dakota, Iowa and Missouri are doing notably good work, the results of which are already becoming apparent. Every women's club, every member of the Women's Medical Auxiliary should be a member of this organization. The South Dakota state medical association, in cooperation with the state board of health and the Women's Field Army for the Control of Cancer should seriously concern itself with the formulation of programs designed to educate the public, and to effect the establishment of cancer clinics in which indigents and other interested parties may receive thorough medical checkups. We have no public health program today more important than that of cancer. Cancer deaths usually occur in the most useful period of life. Cancer can be cured if early recognized, and its development can be prevented on a large scale by recognition of poten-

tially-cancerous and pre-cancerous lesions, followed by corrective measures. Education of the laity to seek medical advice on the first appearance of a suspicious lesion, or symptom, together with encouragement of the physician to assume his obligation as a dispenser of requisite knowledge to his clientele and the public, is essential to the success of this and similar programs.

It appears certain in view of advancing medical thought and activity that clinics will be set up throughout the country, the purpose of which will be to maintain the health of the public and to prevent the full development of disease. It would appear that the practicing physician should deeply concern himself in this movement, and should anticipate this program through the development of health clinics which shall be entirely under the control of the practicing physicians. If this is not done, then here as in other matters of similar import, interested lay organizations, or governmental agencies will step in and inaugurate and control such programs.

In my contact with physicians in South Dakota and elsewhere it is apparent that the civilian medical ranks have been depleted to a potentially dangerous degree. So long as a widespread medical emergency does not occur it may be that most of the physicians on the home front will be able to handle the medical needs of their respective communities in a creditable manner. So far, in South Dakota, this has been done. However, many of the older men in the profession of this state, attempting to do their part in full measure, have already paid the penalty. Several have died from coronary diseases, other forms of heart disease or brain hemorrhage. Others have been forced to give up practice for similar illnesses. Even before the war many of these older men had begun to limit more or less strictly their professional activities, but voluntarily got back into full service when events demanded. In some areas in South Dakota only one physician—usually one pretty well along in years—is servicing large areas. There is no one available to assist him. He gets little or no recreation. He cannot conscientiously take a vacation and he will not forsake the people among whom he has worked so long and who have learned to depend on him. Several counties in the state are without readily accessible medical service. Physicians from other parts of the country cannot be induced to go to these areas temporarily or otherwise even though an emergency may exist. No hospitals are found in these areas and the modernly trained physician is not going to practice in any community where modern facilities are not available. Even before the war several sparsely settled communities, extending in some instances into several adjoining counties, were without physicians. After the war this unhealthful condition will continue and grow more acute unless the citizens of those communities erect and maintain hospitals. One good hospital could serve several counties. Here is a problem crying for solution. I believe our committee on hospitals should cooperate with the state board of health in this matter. A thorough study of this situation should be made at once in an effort to develop a program that should result in the correction of a grievous situation. I recommend this to the serious consideration of the committee.

Many of our medical brethren serving in the armed services—especially those who are serving abroad—will not return to private practice. They will be induced to enter some form of governmental service. Others may not be restored to a civilian status until more than six months after the war ends. To make matters worse, the manpower commission, no doubt on recommendation of the war department, has recently made it impossible for any one contemplating the study of medicine to continue to enter this program unless he is under or over draft age or physically unfit for active service. I have hopes that there are enough solid, far-seeing men in the war department and connected with the manpower commission and its subsidiary agencies to affect a change in this potentially tragic circumstance. Should no satisfactory arrangements be forthcoming at an early period, the force of medical and lay disapproval of the present unsavory and dangerous setup, should be so thoroughly registered in Washington that even the most recalcitrant among our war governing agencies shall be forced to give heed.

Through early and wise activity, the association of American medical colleges has already perfected arrangements whereby the service inducted medico who was forced to subscribe to the restricted school and hospital training because of the exigencies of war, may, on return to this country on a civilian status, enter upon various courses of postgraduate study and hospital services (intern and residencies). This is a fine thing for these young men whose medical background suffered in comparison with that of medical graduates of a considerable period before the war. However, if many take advantage of this program, the public will be deprived of their services for two or more years after they are mustered out of the army. Here again is something to think about.

Finally, may I direct your attention to the fact that the return of our service men from the far corners of the earth, especially from the tropical and semi-tropical areas, is fraught with potential danger to the public from the standpoint of public health. Large numbers of these will have contracted various types of infectious diseases, many of which are foreign to, or at the present, rare in this country. A perusal of medical journals even now indicates what is bound to develop after the war. First reports indicate that the two diseases about which we should particularly concern ourselves are malaria and filariasis. Our state board of health is developing a plan for a state-wide survey of various kinds, pertinent to the problem of transplanting tropical and other diseases among the population. In keeping with our responsibility, it is essential that the physicians at home at once make preparation to meet this eventuality. A knowledge of the various phases of these diseases such as the cause, nature, symptoms, means of spread, diagnosis (with emphasis on laboratory diagnosis), should be acquired by one means or another by every physician.

It is suggested that special short courses developed in connection with the school of medical sciences be established. The head of the department of bacteriology in our school of medical sciences was one of the first to take advantage of the course offered in tropical medicine at Tulane University. Under government auspices and the Markle Foundation, he spent three months of intensive study in this field. This was done so that our school could develop and maintain a course in tropical diseases for sophomore students. The school of medical sciences at the University of South Dakota is fully equipped to give worthwhile instruction to any physician who may wish to avail himself of a special course in this field. I recommend that a committee be appointed to work in cooperation with the state board of health and the university authorities to perfect suitable plans.

Again, may I express my admiration for the physicians in this state who have assumed so many additional burdens and have been carrying on so successfully during these trying times. It is to be hoped that each and every one of you be given health and full vigor for the task ahead.

SOUTH DAKOTA STATE MEDICAL ASSOCIATION ROSTER -- 1944

MEMBERSHIP BY DISTRICTS

ABERDEEN DISTRICT No. 1

PRESIDENT		J. A. Eckrich Aberdeen	Cooley, F. H. Aberdeen	Mayer, R. G. Aberdeen
SECRETARY		J. D. Alway Aberdeen	Damm, W. P. Redfield	★McCarthy, Paul Aberdeen
Aldrich, H. H. Wessington	Drissen, E. M. Britton	Murphy, B. C. Aberdeen	Eckrich, J. A. Aberdeen	Murphy, Robert Aberdeen
Alway, J. D. Aberdeen	*Elward, L. R. Doland	Newkamp, Hugo Hosmer	*Elward, L. R. Doland	Pittenger, E. A. Aberdeen
*Bates, W. A. Aberdeen	Farrell, W. D. Aberdeen	Ranney, T. P. Aberdeen	★Gelber, R. M. Aberdeen	Rudolph, E. A. Aberdeen
★Bloemendall, G. J. Ipswich	Graff, L. W. Britton	Scallin, P. R. Redfield	Graff, L. W. Britton	★Schuchardt, I. L. Aberdeen
Brenckle, J. F. Mellette	Keegan, Agnes Aberdeen	Weishaar, Chas. Aberdeen	King, H. I. Aberdeen	White, W. E. Ipswich
Brinkman, W. C. Veblen	King, Owen Aberdeen	Whiteside, J. D. Aberdeen	King, Owen Aberdeen	
Bruner, J. E. Aberdeen	★Kruzich, S. J. Aberdeen		Marvin, Thomas R. Faulkton	
Bunker, Paul Aberdeen				
Calene, J. L. Aberdeen				

WATERTOWN DISTRICT No. 2

PRESIDENT		M. W. Larson Watertown	Christensen, A. H. Clark	Magee, W. G. Watertown
SECRETARY		A. P. Scheib Watertown	★Cooper, Geo. Watertown	Maxwell, R. T. Clear Lake
★Adams, M. E. Clark	Hammond, M. J. Watertown	Richard, O. S. Watertown	Hickman, G. L. Bryant	Randall, O. S. Watertown
Bartron, H. J. Watertown	Jorgenson, M. C. Watertown	Richards, Geo. H. Watertown	Jorgenson, M. C. Watertown	★Rousseau, M. C. Watertown
Bates, J. S. Clear Lake	Kenney, H. T. Watertown	Scheib, A. P. Watertown	Kenney, H. T. Watertown	Vaughn, J. B. Casrlewood
Brown, H. R. Watertown	Kilgaard, R. M. Watertown	Walters, S. J. Watertown	Kilgaard, R. M. Watertown	Willen, Abner Clark
	Larson, M. W. Watertown			

MADISON DISTRICT No. 3

PRESIDENT		E. S. Watson Brookings	Drobinsky, M. Estelline	Peeke, A. P. Volga
SECRETARY		C. M. Kershner Brookings	Grove, E. H. Arlington	Sherwood, C. E. Madison
Baughman, D. S. Madison	Hofner, E. A. Howard	Tank, M. C. Brookings	Gulbrandsen, G. H. Brookings	*Torwick, E. E. Volga
★Boyd, F. E., Jr. Flandreau	Hopkins, N. K. Arlington	Watson, E. S. Brookings	Hofner, E. A. Howard	Westaby, J. R. Madison
*Butler, C. A. Hot Springs	Jordan, L. E. Chester	*Westaby, R. S. Los Angeles, Calif.	Kershner, C. M. Brookings	Whitson, G. E. Madison
Davidson, Magni Brookings	Miller, H. A. Brookings	Willoughby, F. C. Howard	Miller, H. A. Brookings	
	Muggly, J. A. Madison		Muggly, J. A. Madison	

PIERRE DISTRICT No. 4

PRESIDENT		A. Triolo Pierre	Creamer, F. H. Dupree	Northrup, F. A. Pierre
SECRETARY		M. M. Morrissey Pierre	Embrye, V. W. Onida	Riggs, T. F. Pierre
★Burgess, R. E. Gettysburg	*Hart, B. M. Los Angeles, Calif.	Robbins, C. E. Pierre	*Hart, B. M. Los Angeles, Calif.	★Salladay, I. R. Pierre
Collins, E. H. Gettysburg	Kimble, O. A. Murdo	Schultz, S. Phillip	Kimble, O. A. Murdo	Triolo, A. Pierre
Cowan, J. T. Pierre	Martin, H. B. Harrold	★Van Heuvelan, G. J. Pierre	Martin, H. B. Harrold	
	Morrissey, M. M. Pierre		Morrissey, M. M. Pierre	
	Murphy, Joseph C. Murdo		Murphy, Joseph C. Murdo	

HURON DISTRICT No. 5

PRESIDENT		Paul Tschetter DeSmet	Burman, G. E. Carthage	Saxton, W. H. Huron
SECRETARY		R. A. Buchanan Huron	Gross, D. W. Brookings	Saylor, H. L. Huron
★Adams, H. P. Huron	Hagin, J. C. Miller	Shirley, J. C. Huron	Hagin, J. C. Miller	Tschetter, Joseph Huron
Buchanan, R. A. Huron	Hendricks, Esten Woonsocket	Tschetter, J. S. Huron	Hendricks, Esten Woonsocket	Tschetter, Paul DeSmet
	Jacoby, Hans Huron	Wright, O. R. Huron	Jacoby, Hans Huron	
	Lenz, B. T. Huron		Lenz, B. T. Huron	
	Pangburn, M. W. Miller		Pangburn, M. W. Miller	

MITCHELL DISTRICT No. 6

PRESIDENT		W. G. Rieb Parkston	Bollinger, W. F. Parkston	Jones, T. D. Chamberlain
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Allcott, F. B. Chamberlain	Delaney, W. A. Mitchell	Lloyd, J. H. Mitchell	DeVriess, Albert Platte	Mabee, D. R. Mitchell
Auld, C. V. Plankinton	Dick, L. G. Spencer	Mabee, O. J. Mitchell	Dick, L. G. Spencer	McGreevey, J. V. Mitchell
Ball, W. R. Mitchell	*Ferris, W. T. Chamberlain	Rieb, W. G. Parkston	*Ferris, W. T. Chamberlain	Tobin, F. J. Mitchell
Beukelman, W. H. Stickney	*Freyberg, F. W. Mitchell	★Tobin, L. W. Mitchell	*Freyberg, F. W. Mitchell	★Tobin, L. W. Mitchell
Bobb, B. A. Mitchell	*Fritz, William, Jr. Mitchell	Weber, R. A. Mitchell	*Fritz, William, Jr. Mitchell	Young, E. M. Mitchell
Bobb, C. S. Mitchell	Gillis, F. D. Mitchell		Gillis, F. D. Mitchell	
Bobb, Edward C. Mitchell	Holleman, W. W. Corsica		Holleman, W. W. Corsica	
	Hoyne, Andrew H. Salem		Hoyne, Andrew H. Salem	
	★Jones, J. P. Mitchell		★Jones, J. P. Mitchell	

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	★Billion, T. J., Jr. Sioux Falls		★Billion, T. J., Jr. Sioux Falls	Cottam, G. I. W. Sioux Falls
	Carney, Myrtle S. Washington, D. C.		Carney, Myrtle S. Washington, D. C.	★Craig, Allen Sioux Falls

* Craig, D. W.	Sioux Falls
Cunningham, R. S.	Sioux Falls
Dehli, H. M.	Colton
DeVall, F. C.	Garretson
Donahoe, S. A.	Sioux Falls
Donahoe, W. E.	Sioux Falls
*Duimstra, Fred	Sioux Falls
Dulaney, C. H.	Canton
Erickson, E. G.	Sioux Falls
Erickson, O. C.	Sioux Falls
Fiske, R. R.	Flandreau
*Fitzgibbon, T. G.	Sioux Falls
*Gage, E. E.	Sioux Falls
Gregg, J. B.	Sioux Falls
Groebner, O. A.	Sioux Falls
Grove, A. F.	Dell Rapids
Grove, Stuart	Sioux Falls

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SECRETARY

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Bushnell, Wm. F.	Elk Point
Conner, E. I.	Alcester

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Crane, H. L.	L'Oroya, Peru, S. America
*Davidson, H. E.	Lead
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Dawley, W. A.	Rapid City
Doyle, J. I.	Rapid City
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Kemper, C. E.	Viborg
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Leraan, L. G.	Hartford
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McDonald, C. J.	Sioux Falls
*Mullen, R. W.	Sioux Falls
Nelson, J. A.	Sioux Falls
Nessa, N. J.	Sioux Falls
*Nietfeld, A. B.	Sioux Falls

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Fairbanks, W. H.	Vermillion
Greenfield, J. C.	Avon
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*Hanson, H. F.	Vermillion
Hohf, J. A.	Yankton
Hohf, S. M.	Yankton
*Hubner, R. F.	Yankton
Johnson, Geo. E.	Yankton
Joyce, E.	Hurley
*Kalayjian, D. S.	Parker
*Keeling, C. M.	Springfield

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*Hayes, Paul W.	Hot Springs
Heilesen, W. E.	Custer
Howe, F. S.	Deadwood
*Hummer, F. L.	Lead
Jackson, A. S.	Lead
Jackson, R. J.	Rapid City
Jernstrom, R. E.	Rapid City
Kegaries, D. L.	Rapid City
*Lampert, A. A.	Rapid City
*Lemley, R. E.	Rapid City
Manning, F. E.	Custer
Matlock, W. L.	Deadwood
Mattox, N. E.	Lead
*McGonigle, J. P.	Rapid City
*Merryman, M. P.	Rapid City
Meyer, W. L.	Sanator
Mihran, M. K.	Rapid City
Mills, G. W.	Wall
Minty, F. W.	Rapid City
Morse, W. E.	Rapid City

ROSEBUD DISTRICT No. 10

Lande, L. E.	Winner
Malster, R. M.	Carter
Mannion, J. E.	Gregory

NORTHWEST DISTRICT No. 11

Christie, Roy E.	Eureka
Curtis, J. E.	Lemmon
*Duncan, C. E.	Pollock
George, W. A.	Selby
Harris, L. D.	Mobridge

WHETSTONE VALLEY DISTRICT No. 12

Cliff, F. N.	Milbank
Duncan, William	Webster
Flett, Chas.	Milbank
Gregory, D. A.	Milbank
Hedemark, T. A.	Reville
Judge, W. T.	Milbank

Nilsson, F. C.	Sioux Falls
*Olson, Orland	Sioux Falls
Opheim, O. V.	Sioux Falls
Pankow, L. J.	Sioux Falls
Parke, L. L.	Canton
*Posthuma, Anna	Sioux Falls
Reagan, R.	Sioux Falls
*Sackett, R. F.	Parker
Sercl, W. F.	Sioux Falls
Stenberg, E. S.	Sioux Falls
Stevens, G. A.	Sioux Falls
Stevens, R. G.	Sioux Falls
Stone, J. G.	Montrose
Van Demark, G. E.	Sioux Falls
Volin, H. P.	Lennox
*Zellhoefer, H. W.	Sioux Falls
Zimmerman, Goldie	Sioux Falls

Lacey, V. I.	Yankton
Leonard, B. B.	Yankton
Lietzke, E. T.	Beresford
Maker, L. E.	Yankton
*Malloy, J. F.	Yankton
Morehouse, E. M.	Yankton
Ohlmacher, J. C.	Vermillion
Reding, A. P.	Marion
Schwartz, E. R.	Wakonda
Smith, A. J.	Yankton
Stansbury, E. M.	Vermillion
Tauber, K. S.	Yankton
*Williams, F. E.	Wakonda

Morsman, C. F.	Hot Springs
Newby, H. D.	Rapid City
*Nyquist, R. H.	Ft. Meade
O'Toole, T. F.	Rapid City
Owen, N. T.	Rapid City
*Owen, S. G.	Rapid City
Pemberton, M. O.	Deadwood
Radusch, R. J.	Rapid City
Sadock, T. R.	Wagner
Shapiro, Barnet	Rapid City
*Sherman, K. E.	Sturgis
*Sherrill, S. S.	Belle Fourche
Smiley, J. C.	Deadwood
*Soe, Carl A.	Lead
Spain, M. L.	Rapid City
Stewart, N. W.	Lead
*Stewart, M. J.	Sturgis
Sundet, N. J.	Kadoka
Threadgold, J. O.	Belle Fourch
*Zarbaugh, G. F.	Deadwood

Quinn, R. J.	Burke
Overton, R. V.	Winner
*Studenberg, J. E.	Gregory

Lima, Frank	Hoven
Lowe, C. E.	Mobridge
*Sawyer, J. G.	Mobridge
Spiry, A. W.	Mobridge
Totten, F. C.	Lemmon

Karlins, W. H.	Webster
Murphy, T. W.	Bristol
Peabody, P. D., Sr.	Webster
Peabody, P. D., Jr.	Webster
*Pfister, Faris	Webster
Porter, O. M.	Willmar, Minn.

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* Member of the Armed Services.

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South Dakota State Medical Association-1944

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Adams, G. S.	Yankton	Erickson, E. G.	Sioux Falls	Lande, L. E.	Winner
Aldrich, H. H.	Wessington	Erickson, O. C.	Sioux Falls	Larson, M. D.	Watertown
Allcott, F. B.	Chamberlain	Ewald, P. P.	Lead	Lenz, B. T.	Huron
Alway, J. D.	Aberdeen	Fairbanks, W. H.	Vermillion	Leonard, B. B.	Yankton
Auld, C. V.	Plankington	Farrell, W. D.	Aberdeen	Leraan, L. G.	Hartford
Bailey, J. D.	Rapid City	Fiske, R. R.	Flandreau	Lietzke, E. T.	Beresford
Bailey, S. G.	Hot Springs	Fleegee, R. B.	Lead	Lima, Frank	Hoven
Ball, W. R.	Mitchell	Flett, Chas.	Milbank	Lloyd, J. H.	Mitchell
Bartron, H. J.	Watertown	* Freyberg, F. W.	Mitchell	Lowe, C. E.	Mobridge
Bates, J. S.	Clear Lake	Fuchlow, J. R.	Rapid City	McDonald, C. J.	Sioux Falls
* Bates, W. A.	Aberdeen	* Gage, E. E.	Sioux Falls	McGreevey, J. V.	Mitchell
Baughman, D. S.	Madison	George, W. A.	Selby	Mabee, D. R.	Mitchell
Beukelman, W. H.	Stickney	Gillis, F. D.	Mitchell	Mabee, O. J.	Mitchell
Bilger, F. W.	Hot Springs	Graff, L. W.	Britton	Magee, W. G.	Watertown
Billingsley, P. R.	Sioux Falls	Greenfield, J. C.	Avon	Maker, L. E.	Yankton
Billion, T. J.	Sioux Falls	Gregg, J. B.	Sioux Falls	Malster, R. M.	Carter
Blezek, F. M.	Tabor	Gregory, D. A.	Milbank	Manning, F. E.	Custer
Bobb, B. A.	Mitchell	Groebner, O. A.	Sioux Falls	Mannion, J. E.	Gregory
Bobb, C. S.	Mitchell	Gross, D. W.	Brookings	Martin, H. B.	Harrold
Bobb, Edward C.	Mitchell	Grove, A. F.	Dell Rapids	Marvin, Thos. R.	Faulton
Bollinger, W. F.	Parkston	Grove, E. H.	Arlington	Matlock, W. L.	Deadwood
Brenckle, J. F.	Mellette	Grove, Stuart	Sioux Falls	Mattox, N. E.	Lead
Brinkman, W. C.	Veblen	Gulbrandsen, G. H.	Brookings	Maxwell, R. T.	Clear Lake
Brookman, L. J.	Vermillion	Haas, F. W.	Yankton	Mayer, R. G.	Aberdeen
Brown, H. R.	Watertown	Hagin, J. C.	Miller	Meyer, W. L.	Sanator
Bruner, J. E.	Aberdeen	Hammond, M. J.	Watertown	Mihran, M. K.	Rapid City
Buchanan, R. A.	Huron	Hanson, O. L.	Valley Springs	Miller, H. A.	Brookings
Bunker, Paul	Aberdeen	Hare, Lyle	Spearfish	Mills, G. W.	Wall
Burman, G. E.	Carthage	Harris, L. D.	Mobridge	Minty, F. W.	Rapid City
Bushnell, Wm. F.	Elk Point	* Hart, B. M.	Los Angeles, Calif.	Morehouse, E. M.	Yankton
* Butler, C. A.	Hot Springs	Hedemark, T. A.	Reville	Morrissey, M. M.	Pierre
Butler, John M.	Hot Springs	Heilesen, W. E.	Custer	Morse, W. E.	Rapid City
Calene, J. L.	Aberdeen	Hendricks, Esten	Woonsocket	Morsman, C. F.	Hot Springs
Carlson, R. J.	Sisseton	Hickman, G. L.	Bryant	Muggly, J. A.	Madison
Carney, Myrtle Washington, D. C.	Washington, D. C.	Hofer, E. A.	Howard	* Mullen, R. W.	Sioux Falls
Christenson, A. H.	Clark	Hofer, E. J.	Valley Springs	Murdy, B. C.	Aberdeen
Christie, Roy E.	Eureka	Hohf, J. A.	Yankton	Murdy, Robert	Aberdeen
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Clark, O. H.	Newell	Holleman, W. W.	Corsica	Murphy, T. W.	Bristol
Cliff, F. N.	Milbank	Hopkins, N. K.	Arlington	Nelson, J. A.	Sioux Falls
Cochran, F. B.	Plankington	Howe, F. S.	Deadwood	Nessa, N. J.	Sioux Falls
Collins, E. H.	Gettysburg	Hoyne, A. H.	Salem	† Newby, H. D.	Hosmer
Conner, E. I.	Alcester	* Hummer, H. R.	Sioux Falls	Nilsson, F. C.	Sioux Falls
Cooley, F. H.	Aberdeen	Hyden, Anton	Sioux Falls	Northrup, F. A.	Pierre
Cottam, Gilbert	Pierre	Jackson, A. S.	Lead	Ohlmacher, J. C.	Vermillion
Cottam, G. I. W.	Sioux Falls	Jackson, R. J.	Rapid City	Opheim, O. V.	Sioux Falls
Cowan, J. T.	Pierre	Jacoby, Hans	Huron	O'Toole, T. F.	Rapid City
Craig, D. W.	Sioux Falls	Jernstrom, R. E.	Rapid City	Overton, R. V.	Winner
Crane, H. L.	L'Oroya, Peru,	Johnson, Geo. E.	Yankton	Owen, N. T.	Rapid City
	S. America	Jones, T. D.	Chamberlain	Pangburn, M. W.	Miller
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Cunningham, R. S.	Sioux Falls	Jorgenson, M. E.	Watertown	Parke, L. L.	Canton
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Davidson, Magni	Brookings	* Kalayjian, D. S.	Parker	Peeke, A. P.	Volga
Davis, J. H.	Belle Fourche	Karlins, W. T.	Webster	Pemberton, M. O.	Deadwood
Dawley, W. A.	Rapid City	Kauffman, E. J.	Marion	Pittenger, E. A.	Aberdeen
Dehli, H. M.	Colton	Keegan, Agnes	Aberdeen	Porter, O. M.	Willmar, Minn.
Delaney, W. A.	Mitchell	Keeling, C. M.	Springfield	* Posthuma, Anna	Sioux Falls
DeVall, F. C.	Garretson	Keene, F. F.	Wessington Springs	Quinn, R. J.	Burke
DeVries, Albert	Platte	Kegaries, D. L.	Rapid City	Radusch, R. J.	Rapid City
Dick, C. G.	Spencer	Keller, S. A.	Sioux Falls	Randall, O. S.	Watertown
Donahoe, S. A.	Sioux Falls	Kemper, C. E.	Viborg	Ranney, T. P.	Aberdeen
Donahoe, W. E.	Sioux Falls	Kennedy, H. T.	Watertown	Reagan, R.	Sioux Falls
Doyle, J. I.	Rapid City	Kershner, C. M.	Brookings	Reding, A. P.	Marion
Drissen, E. M.	Britton	Kilgaard, R. M.	Watertown	Richards, Geo. H.	Watertown
Drobinsky, M.	Estelline	Kimble, O. A.	Murdo	Rieb, W. G.	Parkston
Duggan, T. A.	Wagner	King, H. I.	Aberdeen	Riggs, T. F.	Pierre
Dulaney, C. H.	Canton	King, Owen	Aberdeen	Robbins, C. E.	Pierre
Duncan, Wm.	Webster	Kittleson, J. A.	Sioux Falls	Rudolph, E. A.	Aberdeen
Eckrich, J. A.	Aberdeen	Lacey, V. I.	Yankton	Sadock, T. R.	Wagner
Embry, V. W.	Onida	Lamb-Barger, H. H.	Sioux Falls	Saxton, W. H.	Huron

Saylor, H. L. Huron
 Scallin, P. R. Redfield
 Scheib, A. P. Watertown
 Schuchardt, I. L. Aberdeen
 Schultz, S. Phillip
 Schwartz, E. R. Wakonda
 Sercl, W. F. Sioux Falls
 Shapiro, Barnet Rapid City
 Sherwood, C. E. Madison
 Shirley, J. C. Huron
 Smiley, J. C. Deadwood
 Smith, A. J. Yankton
 Spain, M. L. Rapid City
 Spiry, A. W. Mobridge
 Stansbury, E. M. Vermillion
 Stenberg, E. S. Sioux Falls

Stewart, N. W. Lead
 Stevens, G. A. Sioux Falls
 Stevens, R. G. Sioux Falls
 Stone, J. G. Montrose
 Sundet, N. J. Kadoka
 Tank, M. C. Brookings
 Tauber, K. S. Yankton
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 Tobin, F. J. Mitchell
 * Torwick, E. E. Volga
 Totten, F. C. Lemmon
 Triolo, A. Pierre
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 Tschetter, J. S. Huron
 Tschetter, Paul DeSmet
 Van Demark, G. E. Sioux Falls

Vaughn, J. B. Castlewood
 Volin, H. P. Lennox
 Walters, S. J. Watertown
 Watson, E. S. Brookings
 Weber, R. A. Mitchell
 Weishaar, Chas. Aberdeen
 Westaby, J. R. Madison
 * Westaby, R. S. Los Angeles, Calif.
 White, W. E. Ipswich
 Whiteside, J. D. Aberdeen
 Whitson, G. E. Madison
 Willen, Abner Clark
 Willoughby, F. C. Howard
 Wright, O. R. Huron
 Young, E. M. Mitchell
 Zimmerman, Goldie Sioux Falls

* Honorary or Affiliate Member.
 † Deceased.

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 Adams, M. E. Clark
 Andre, Hugo C. Vermillion
 Athey, G. L. Chamberlain
 Auld, M. A. Yankton
 Billion, T. J., Jr. Sioux Falls
 Bliss, R. J. Sioux Falls
 Bloemendall, G. J. Ipswich
 Boyd, F. E. Flandreau
 Burgess, R. E. Gettysburg
 Bushnell, J. W. Elk Point
 Catey, Robert Mobridge
 Clark, B. S. Spearfish
 Cooper, Geo. Watertown
 Craig, Allen Sioux Falls
 Davidson, H. E. Lead
 Dick, Fred Vermillion
 Duimstra, Fred Sioux Falls
 Duncan, C. E. Pollock
 Ferris, W. T. Chamberlain
 Fitzgibbon, T. G. Sioux Falls

Gelber, M. R. Aberdeen
 Hanson, H. F. Vermillion
 Hanson, O. L., Jr. Valley Springs
 Hayes, P. W. Hot Springs
 Hill, W. H. Centerville
 Hubner, R. F. Yankton
 Hummer, F. L. Lead
 Jones, J. P. Mitchell
 Kittelson, Otis Yankton
 Kruzich, S. J. Aberdeen
 Lampert, A. A. Rapid City
 Lemley, R. E. Rapid City
 Lovre, S. C. Humboldt
 McCarthy, P. V. Aberdeen
 McGonigle, J. P. Rapid City
 Malloy, J. F. Yankton
 Merryman, M. P. Rapid City
 Nietfeld, A. B. Sioux Falls
 Nyquist, R. H. Ft. Meade
 Olson, Orland Sioux Falls
 Owen, Stanley Rapid City

Pfister, Faris Webster
 Rousseau, M. D. Watertown
 Sacket, R. F. Parker
 Salladay, I. R. Pierre
 ‡ Schuchardt, I. Aberdeen
 Sherman, K. E. Sturgis
 Sherrill, S. Belle Fourche
 ‡ Smiley, J. C. Deadwood
 Soe, Carl A. Lead
 Stewart, M. J. Sturgis
 Thompson, Arnold Sioux Falls
 Tobin, L. W. Mitchell
 Wayne, D. M. Redfield
 Williams, F. E. Wakonda
 Van Heuvelan, G. J. Pierre
 Zarbaugh, G. F. Deadwood
 Zellhoffer, H. W. K. Sioux Falls

‡ Medical discharge; returned to practice.

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(Currently non-active)

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(Currently non-active)

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ADDRESS OF PRESIDENT-ELECT*

D. S. Baughman, B.S., M.D., F.A.C.S.

Madison, South Dakota

Mr. President, Members of the South Dakota State Medical Association, and Guests:

Standing on the threshold of a new year our association may be confronted with the most important era in the sixty-four years of its existence. Never have conditions been so uncertain and troublesome. The ethical, scientific and economic standards of our beloved profession are seriously threatened by disturbing forces both from without and within. A legislative year in our own state always means added responsibility and extra work for the officers of the association. Moreover, the medical profession of the entire nation has been fiercely attacked by designing politicians and fanatic social reformers. Regardless of the fact that we may feel that our conscience is clear, that these attacks are malicious and the unfavorable accusations are unfounded, we must admit that great damage has been done. Confidence of the patient in the personal physician is of prime importance both for the best interest of the patient and the success of the efforts of the doctor. Likewise confidence of the general public in the medical profession has been a keystone throughout the years and has made it possible for the conscientious, altruistic, hard working men and women of medicine to go forward and bring to the individual and to the nation the highest standards of health in the world today.

Admitting that we are face to face with difficult problems with more and worse to come in the very near future, we must not surrender. Without exception, the pioneers in the profession were confronted with even greater handicaps and their work and discoveries ridiculed and discredited not only by the public but also, too often, by professional contemporaries. You remember, I am sure, the antagonism encountered by Harvey, Jenner, Lister, Pasteur, Semmelweis, Holmes, Murphy, Mayo Brothers and many others. These men had the courage of their convictions and fortunately for humanity carried on in spite of the opposition from jealous men within the profession as well as prejudices and skepticism in general. These men had new discoveries and new methods to give to the world but their work and contributions form the very foundation of what we today are striving to preserve.

Our critics claim that the motives of the organized medical fraternity are mercenary and selfish and maintain that by a system of socialized medicine the public would benefit by a better distribution of good medical care to all. We do not agree and the information obtained by a study of the results of socialized medicine in various European countries as well as that of more or less localized experiments in our own country favor our belief. Therefore, our problem is to inform our patients and acquaintances of the true facts and by so doing we will have the support of the general public.

You have honored me highly by giving me the opportunity to serve as the head of the profession in South Dakota for the ensuing year. I anticipate a busy and trying year and ask your wholehearted support and full cooperation. The success of any organization is far more dependent upon the rank and file than it is upon the officers alone. A dictatorship anywhere leads only to ruin and any executive who tries to run a "one man show" is certain to be a failure.

As we embark on another year it might be helpful if we were to set up some objectives. I shall mention a few that seem worthwhile to me and urge each and every member to suggest others.

As objective number one let us make a united effort to increase our membership. Every qualified practitioner in the state should be a member of the district and state associations. This can be accomplished if the members of the local districts will forget petty jealousies and personalities and meet the non-members more than half way. I would appreciate it if the councilor of each district would report at our first meeting of the council the number of physicians in the district and if there be any who are not members, the reason why.

For the second objective I would like to see the component districts and ladies auxiliaries become more active. Every component district should have an organized and active ladies aux-

*Annual meeting of the South Dakota State Medical Association May 21, 22, 23, 1944, Huron, South Dakota.

iliary and both should hold regular and frequent meetings. The strongest and most effective districts hold regular meetings monthly. It is my hope that the councilor of every district in the next annual report can tell us that the district has an active ladies auxiliary and that at least six successful meetings were held during the year.

As a third objective we should give thoughtful consideration of ways and means for the extension of good medical care to everyone. By friendly and intelligent cooperation with interested organizations such as the South Dakota Tuberculosis Association, Women's Field Army for Control of Cancer, the Infantile Paralysis Foundation, the American Legion and Auxiliary and similar groups, a valuable educational program can be carried on in every community. Every one of us should inform our patients of the value and importance of preventive medicine and urge immunizations, pre-natal care, periodic health examinations, etc. Our intelligent, well-to-do patients will readily avail themselves of these benefits if and when they are convinced of their value. For the low income groups the various plans of prepayment, group and individual health insurance may be the solution. The indigent should be the responsibility of the county and we must educate the county commissioners. It should not be very difficult to convince the man of average intelligence that it is not only humanitarian but also is good business for a county to spend a few dollars for immunizations, tonsillectomies, obstetrical care, sterilizations of the unfit, etc. Finally, if there should be anyone in any community that does not qualify under any of the aforementioned groups, I am sure we can find a way to provide good care for them.

The fourth and last objective that I want to present for your consideration concerns the ever increasing encroachment of the cults into the practice of medicine. In order that I may not be misunderstood let me state that the remarks which follow are not meant for the Christian Science practitioner who limits his practice to Christian science; for the chiropractor who limits his practice to "spinal adjustments"; for the osteopath who limits his practice to osteopathic manipulations or for any and all of the drugless practitioners. Every legislative year your officers have had to spend valuable time and all of us considerable cold cash to try to defeat the efforts of these "drugless healers" in their efforts to secure the right to practice medicine, to use drugs and to perform surgical operations and to be granted access to our hospitals. As many of you know, I have been a strong advocate of putting our money and efforts into an aggressive movement to limit the cults to the methods of healing upon which their schools were founded and for which they have been trained. Many of these drugless healers are folks who have a strong desire to treat the sick and injured but who for various reasons, most often scholastic, have been unable to gain an M.D. degree and thus become regular practitioners. And at this point I want to ask those in authority whether or not it might not be better for the public and the medical profession to turn out more general practitioners and fewer specialists. Many a good prospective family doctor has been forced to become an irregular practitioner because some full-time Ph.D. professor flunked him in histology. Thirty-five years ago I was an instructor in a college of medicine and a college of dentistry in a large city and from my observation and experience of more than a third of a century I do not believe any instructor who has not had practical experience in either profession should be given the authority to decide the fate of a student's career.

The general practitioner, the family doctor if you please, has always been the mainstay of the profession but if the trend in medical training continues he will soon be extinct. Already as our patriotic colleagues leave the smaller communities to serve their country their places are being snapped up by the irregular practitioners who seem to have no difficulty in obtaining exemption from military service. The basic science law is constructive but is not enough. If our legislature sees fit to pass laws permitting "drugless healers" to use drugs, practice obstetrics and perform surgical operations they should also require them to pass the same examinations for a license to practice as is required for those of the regular profession.

Students' Health Service Experience in Outpatient Care of Army Students*

M. M. Weaver, M. D., and R. G. Hinckley, M.D.

Minneapolis, Minnesota

MEDICAL service needs of men under military regime are recognized as being increased, judged by the physician ratio maintained in the Armed Forces, which is six physicians per one thousand military personnel.¹ It was the purpose of this study to review out-patient experience with civilian and army groups at the University of Minnesota Students' Health Service for the light this might shed on medical care required by non-combatant personnel. Physical and psychological reactions due to stresses of military living, duty, and difficulties of selection have been recognized as contributing to the medical load. The experience of the psychiatric clinic was reviewed in some detail, together with the total outpatient experience as possibly illuminating any such factors under these conditions in comparison with those of the civilian student body. Army groups began to be assigned to the University early in 1943 for special courses. The period of September through December, 1943, was chosen for analysis because this afforded the most adequate comparison in terms of optimal functioning and representative samples. Exactly similar complete Health Service facilities were afforded both groups. The only separation occurred by reason of routine army sick call at 7:30 each morning whereas civilians usually choose a somewhat later hour for dispensary visits.

Army groups included three Army Air Force units—the 88th College Training Detachment (CTD), 53rd Technical Training Detachment (TTD), and 46th War Service Detachment (WTS). The remainder of the army units comprised the Army Specialists Training Unit (ASTU) with two companies of advanced engineers (Companies A and B), one company of basic engineers (Company E), one company of freshman and sophomore medical and dental students (Company C), one company of junior and senior medical and dental students (Company D), one company of European language students (Company F), and one company of Asiatic language, Asiatic area, and psychology students (Company G). A small military fatigue group is also included under ASTU. A number of students cared for on a contract basis appear in the figures for civilians. These included a group of young women known as Curtis-Wright Cadets, and a similar group as Minneapolis-Honeywell Trainees. The Navy gave medical care to its own personnel through officers detached for this purpose. Calculations were based upon cumulative population figures, i. e., the number of individuals enrolled in the University on September 1, 1943, together with any students who subsequently enrolled up to December 31, 1943. This was considered sounder than using a figure for any given day since the number in the army group fluctuated markedly. Man days would have afforded a sounder comparison of dispensary load within army groups but

would not be expressing the same thing in civilian living and man hours under comparable conditions could not be calculated. This, in fact, embraces one of the main factors of difference under army regime. Case rates, as determined for the psychiatric load, can only be expressed in terms of individuals exposed to risk. Therefore a basis of cumulative populations was used throughout. It is to be emphasized that this method of calculation weights the comparison of army personnel with civilians in favor of lower army case rates and lighter dispensary load, particularly the latter (on the basis of population and time).

DISPENSARY EXPERIENCE: DISCUSSION AND SUMMARY

The data of Tables 1 and 2 are summarized and condensed from the daily dispensary blotters of the Students' Health Service. The diagnostic categories were selected to emphasize significant differences in the number and kinds of presenting complaints and the medical follow-up of army trainees as compared with civilian male students (Table 1). A similar tabulation (set off by double lines) for women students is quite similar to the experience in peace time and no further comment will be made regarding it. Table 2 affords a comparison of the medical experiences with various units of the army group. Except for consultations all figures represent primary diagnoses. Subsequent visits to the Health Service and all referrals to the consulting staff as necessitated by a continuing illness or for special diagnosis or treatment go together to make up the figure for consultations. Acute conditions are not differentiated from chronic and the classification adopted necessarily incorporates many diverse diagnoses, as for instance combination of otolaryngological complaints with upper respiratory infections under the single heading Upper Respiratory Complaints.

It is not possible to fully analyze here the reasons, if they are ascertainable, why the soldiers on this campus should have experienced a higher incidence of upper respiratory, gastrointestinal, dermatological, and surgical complaints than did the civilian males during the period of observation. The confirmatory evidence may be remarked that intimate living conditions of an army barracks seem conducive to dissemination of upper respiratory infections. Our surgical experience was definitely enlarged as a result of the physical training activities prescribed by the Army which resulted at times in playing basketball in sock feet or football without protective gear. The improved physical condition of trainees upon transfer away from the campus undoubtedly justified the means for its attainment.

Certain additional physical and psychological factors should be taken into account in evaluating discrepancies between army and civilian experience. Several factors

*From the Students' Health Service, University of Minnesota.

appear in the differences of rates by units (Table 2). From the standpoint of basic physical status the trainees of the Army Air Force had the advantage because of more careful screening, physically and mentally, before being assigned to the University of Minnesota. A number of ASTU students were on a limited service status. Quarters, messing, and physical training were comparable for all units except that the air cadets of the CTD were housed in the converted facilities of the football stadium while other soldier-students were assigned by companies to the men's dormitories of the University. Physical activities other than conditioning drills included for the CTD and WTS units a limited amount of flying. Specified hours of study were in force in the evening for all groups and week end leaves were comparable in all units. Some difference in reactions to the Minnesota climate might be anticipated in view of the arrival of new groups of aviation trainees from training camps in the south during the late fall and winter months whereas members of the ASTU had, in the majority of instances, been stationed in Minneapolis for some months prior to September, 1943.

Availability of physicians' services for the army units as contrasted with civilian students requires special comment. While there was no prohibition on the part of company commanders of their men consulting physicians outside the Students' Health Service, it seems justified to conclude that in matters of health our figures for army personnel represent very close to 100 per cent of the medical care given these soldiers. On the other hand, a large proportion of the civilian students are residents of the Twin Cities and as such have in many cases in the past retained the services of their family physicians while attending the University. While such a situation in no way affects a comparison of Health Service load as between army and civilians, it may be an important factor in computing the actual medical services required by the later group in any given period.

PSYCHIATRIC EXPERIENCE: DISCUSSION AND SUMMARY

Mental hygiene case rates were higher for civilians (Table 3, a) than for army students but not significantly so. Actual rate of incidence of psychiatric problems

TABLE 1
Presenting Complaints by Major Categories
Army Trainees vs. Civilian Students
September 1 - December 31, 1943

	Army (3898)		Civilian Men (2782)		Civilian Women (4898)	
	Number	R/1000	Number	R/1000	Number	R/1000
Upper Respiratory Complaints	2058	528.0	249	89.5	714	145.8
Gastrointestinal Complaints	311	79.8	51	18.3	79	16.1
Surgery	969	248.6	206	74.0	182	37.2
Ophthalmology	236	60.5	138	49.6	355	72.5
Dermatology	629	161.4	161	57.9	265	54.1
Consultations and Undifferentiated	5124	1314.5	2751	988.9	5010	1022.9
Total Visits	9327	2392.8	3556	1278.2	6605	1348.5

among army students may have been higher because numbers of the army students remained but short periods. However, this must weigh against possible but unknown civilian cases obtaining private care. Some of the increased general medical load for army students probably was a reflection of such higher incidence (Table 1). Army case rates appear to vary markedly for specific units (Table III, b). The sample for these units was too small to permit emphasis upon such differences. Thus, none of the unit differences in rate from the remaining army group could be estimated as significant except for the highest rate, Company B ($P = .02$). A similar experience with this group existed throughout the Health Service, which would tend to confirm this latter point. Initial selection and placement by the army^{2,3} would appear to be a main factor in any real differences. This was especially true of those psychiatric cases from Company G where the personalities were more varied and widely deviant from normal than in the small samples from other groups. It was noted that CTD and WTS, both composed of aviation students, closely approximated the same medium rate. Army cases demanded more immediate diagnosis for proper disposition in referral or treatment. A somewhat different point of view and criterion applied to army cases as compared to civilian ones. The individual's value to the army and his ability to perform as a soldier were criteria rather than the individual's

TABLE 2
Presenting Complaints by Major Categories
Army Air Force vs. Army Specialized Training Unit
September 1 - December 31, 1943

	Army Specialized Training Unit (2121)		Army Air Force (1777)					
	Companies A, B, C, D, E, F, G		CTD (1129)		TTD (394)		WTS (254)	
	Number	R/1000	Number	R/1000	Number	R/1000	Number	R/1000
Upper Respiratory Complaints	1019	480.4	614	543.8	227	576.1	198	779.6
Gastrointestinal Complaints	153	72.1	60	53.1	87	220.8	11	43.3
Surgery	481	226.8	241	213.5	182	461.9	65	255.9
Ophthalmology	160	75.4	32	28.3	38	96.4	6	23.6
Dermatology	325	153.2	201	178.0	84	213.2	19	74.8
Consultations and Undifferentiated	2792	1272.6	1439	1236.6	730	1766.6	163	622.0
Total Visits	4930	2324.3	2587	2291.4	1348	3421.3	462	1818.9

TABLE 3

Psychiatric Clinic Case Rates				Significance of Difference ^c		
Unit	Cumulative Population	Number of Cases	R/10000	S.E.*	k	P
a) Civilian	7680	95	123.70	12.20	1.00	.32
Army	3898	40	102.62	17.20		
b) ASTU	2053	24	116.9	*Based on $\pi_i =$ Average of paired rates.		
Company A	317	5	157.7			
Company B	268	5	186.6			
Company C	233	0	—			
Company D	304	2	65.8			
Company E	359	1	27.9			
Company F	152	2	31.6			
Company G	420	9	214.3			
CTD	1129	8	70.9			
TTD	394	6	152.3			
WTS	254	2	78.7			
Other	68	0	—			

ability to adjust to his own environment. No statistical significance was found between the 2.9 interview hours per army case compared to 2.6 hours for the civilian. Heavy weighting of the civilian group was found in the younger ages and to a lesser extent in the older ages, but a mean age of 23.1 years showed no statistically significant difference from the mean army age of 23.8 years. Length of army service in the cases coming to attention averaged eight months. The most frequent length of service (one-third of the cases) was six months. These cases might be reasoned as representing previously missed illnesses and personality problems; those of unique immediate situation, and those arising with continued stress, since initial adjustment problems may be presumed to have been adequately resolved or cared for.⁴

Psychopathology. Experience with civilian college students has led to the realization that the vast majority of problems will be of psychobiological character, i. e., problems of personality organization and adaptation (Borderline). The present study revealed 69 such cases as against 24 psychoneurotic reactions, 1 traumatic reaction, and 1 psychotic reaction. Army cases showed (Table 4, a) a significantly lower proportion of personality problems and a statistically significant higher occurrence of diagnostic psychopathology, specifically psychoneurotic reactions. In the army cases there was no major psychotic reaction and again but one traumatic reaction. Army students showed higher case rates for anxiety reactions, conversion hysteria, mixed psychoneurotic reactions, as well as for problems more properly labeled as psychosomatic. Samples in specific categories by units (Table 4, b) were too small for accurate statistical inference, but the trend would appear significant. The anxiety reactions were of fairly acute character and appeared about equally weighted by personality and situational factors. Only 2 cases of panic or maximal fear were noted, one basically of homosexual derivation and the other in an aviation student with inferior intellectual resources, discrepantly deficient educational background, and about equally

divided loyalties between a love for and satisfaction with his family, and the necessity to become a flyer through sense of duty and self-respect.

Conversion hysteria, relatively infrequent in our civilian students, accounted for almost one-fourth of the army cases. It was, in each case except one, in the nature of an acute episode and transitory. While personality factors and previous experiences and reactions were found to be of some importance, this seemed here to be outweighed by immediate situational factors. A particularly interesting response in this regard was among several aviation students in their first flight experience. The mixed psychoneurotic reactions appeared more basically personality determined in dynamics. Psychosomatic cases, of which undoubtedly only a few of the more evident ones reached the psychiatric clinic, seemed in general to be about equally weighted in determination by constitutional, personality, and situational factors.

The various groups of dynamic factors contributing to psychobiological and psychopathological reactions were recognized grossly as mentioned. Specific ones may be of interest. Hereditary influences, as usual, were most poorly defined. Only in the family history of several of those cases where cyclothymic personality seemed to be a definite factor was there even moderate evidence. In constitution the main evidence was among a few individuals of obviously dysplastic build where this might be considered in the light of requirements of army life and less than average integration.⁵ However, there was almost complete evidence for the support of a large constitutional factor in the psychosomatic cases, as well as for each such case demonstrating suppression of emotion on the basis of continued frustration resulting from the given personality complex in the army environment and discipline. Probably only one-third of those cases gave evidence to support the inference that this reaction would have maintained in an environment of their own choice (and not a minimal or unique one). Among experiences and personal background factors that appear worth mentioning as characteristic in any number of cases the following are cited: previous degree of formal education appeared to be important in 21 cases — 2 with less than eighth grade; 12 with less than four years of high school; and 7 with more than five years of college. Historical evidence as to living adjustment was for chronically poor adjustment in 17 cases, fair in 11, and good in only 12. Here it was of some interest that of the 8 cases from CTD (aviation students) who represented a more select group, 5 were in the group of good previous living adjustment, and three in the group of fair adjustment. Situational factors found to be of most frequent or important character were the following: regimentation and lack of freedom or privacy was outstanding but mainly in its stress of long continuation without known future letup, together with side tracking to educational pursuit in individuals motivated for more direct action. A high pressure, demanding routine, together with the hazard of examinations, was more emphasized than in ordinary civilian college groups. This latter, coupled with the insecurity in lack of knowledge as to the next move and the seeming failure of the army to make use of the edu-

TABLE 4

Psychiatric Clinic Case Rates (a) Major Psychotic and Organic Reaction	Army (3898)		Civilian (7680)		Significance of Difference			
	Number 1	R ² /10000 2.6	Number 2	R ² /10000 2.6	S.E.*-R ²	S.E.*-R ²	k	P
Psychoneurotic Reaction	25	64.14	24	31.25	10.39	7.41	2.58	.01
Problems of Personality	14	35.92	69	89.84	13.53	9.63	3.25	.001
b) Psychoneurotic Reactions					*Based on pi = Average of paired rates.			
Anxiety state and anxiety hysteria	8	20.5	10	13.0				
Conversion hysteria	9	23.1	3	3.9				
Mixed neurotic reactions	5	12.8	3	3.9				
Obsessive-compulsive reactions	1	2.6	2	2.6				
Reactive depression	2	5.1	6	7.8				
Problems of Personality								
Undifferentiated	5	12.8	58	75.5				
Psychosomatic	8	20.5	9	11.3				
Psychopathic personality	1	2.6	2	2.6				

cation being striven for loomed large as a general morale factor which was reflected acutely in these cases. Furloughs and visits by relatives and wives (12 married, 5 cohabiting) resulting in upsetting or unfavorable stimuli were important with appreciable frequency. Last in such a group was the matter of comparatively inadequate and dormitory living conditions (in comparison with civilian group). Regarding this latter point, it would be only fair to recognize the converse among medical and dental students where the service meant uniform, pay, and freedom to select living conditions (for a time). This group as civilians ordinarily affords its proportion of cases, but those in Company C (Table 3) failed to present a single case in this period.

As to disposition of the army cases after diagnosis, 5 were referred for reclassification, 6 were recommended for discharge (5 discharges were gained), 2 were transferred or failed before recommendation could be made, and 26 were carried therapeutically. By all available objective and subjective criteria, the effort of the clinic resulted in failure in 3 cases; was intermediate or indeterminate in 10 cases; and immediately successful in proper disposal or therapy relative to army performance in 22 cases, in which for 6 cases the ultimate prognosis appeared excellent (chronic problems). Estimates could not be gained as to 5 cases.

BRIEF

Soldier students demonstrated markedly higher rates of incidence in respiratory, gastrointestinal, dermatological and surgical complaints. This was also true for the over-all dispensary load. Mental hygiene case rates compare favorably between army and civilian students under the conditions cited. Evidence of initial selection seemed apparent in case rates by specific army units. Definite psychopathology was significantly greater in the army cases. This was primarily of psychoneurotic reaction type. Army cases require a specific medical perspective. Emphasis occurs upon the individual's ability to perform as a soldier rather than on his ability to carry on without harm at a minimal, individual, or modified level. The conditions of this experiment afford evidence of health service load comparisons but limit inferences as to rates of incidence between civilian and army groups.

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WAR GRADUATE MEETINGS

The next war-time graduate medical meetings in this area, two in number, held simultaneously, will be on September 20. At Camp McCoy, Sparta, Wisconsin, the subject will be Diseases of the Intestinal Tract, under three divisions, (a) regional ileitis, colitis, diverticulitis, diagnosis and treatment, (b) dysentery—army and bacillary, (c) malignancies. At Truax Field, Madison, Wisconsin, the meeting will be devoted to Malignancies in the Army Age Group, (a) melanomata, (b) teratomata, (c) lymphoblastomata.

The official bulletin, published monthly in Philadelphia, in its issue of August 15 reports thus on Region No. 15 (Minnesota, Iowa)—Dr. W. A. O'Brien, chairman; Dr. E. H. Rynearson, Dr. W. H. Cole: "An excellent War-Time Graduate Medical Meeting has been reported at the Schick General Hospital, Clinton, Iowa, on August 11. The entire membership of the Iowa State Medical Society was invited to attend.

Differential Diagnosis of Acute Glaucoma

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MAC KENZIE first stressed the association of glaucoma with increased tension of the eyeball in 1830, but present knowledge of glaucoma has its beginning in 1855 when Weber noted cupping of the optic disc.

An acute glaucomatous attack is one of the most dreadful occurrences in medicine. It usually, but not invariably, starts suddenly and violently in one eye during the early hours of the morning when the diurnal variation of the tension is at its highest level. The constitutional disturbance may be so great that the patient is prostrated, with an irregular, intermittent pulse, pallid face and cold extremities. Ophthalmoscopic examination is usually impossible through the edematous cornea, but if the optic disc can be seen it is edematous and hyperemic. (Instillation of glycerine sometimes clears the cornea sufficiently to permit an ophthalmoscopic examination.)

The pain radiates throughout the entire head and is most intense in the trigeminal nerve. Its acute onset even though associated with nausea differentiates glaucoma from intercranial conditions. The pain is due primarily to pressure on the ciliary nerve and ciliary plexus. An immediate hypodermic of morphine for relief of pain and apprehension is imperative.

Edema of the eyelids is not always a constant finding. Lacrimation, however, is important in the diagnosis, especially when it occurs without any external cause and is primarily due to reflex irritation of the lacrimal nerve. Cold applications are indicated to relieve the lid condition.

In severe attacks of glaucoma, the entire bulbar conjunctiva and sclera present engorged and dilated vessels so uniform that there is a deep red color present. This congestion is primarily a venous stasis from the increased intraocular pressure. In some cases, minute hemorrhages may be seen.

The cornea presents the usual characteristic steamy appearance. Later the epithelium becomes elevated and is edematous. The underlying stroma is edematous and is more or less translucent. The steamy cornea is now anesthetic because of the increased pressure upon the sensory nerve filaments. Increased edema is followed by vesicle formation involving the superficial epithelium.

The anterior chamber is always shallow in an attack of inflammatory glaucoma. After the iris comes in contact with the posterior surface of the cornea, adhesions rapidly form within twenty-four hours. After 36 to 48 hours these adhesions become so dense that it is often impossible to break them except by operation.

The dilated often irregular and rigid pupil is one of the most characteristic objective symptoms in acute congestive glaucoma.

In a severe attack of *acute* inflammatory glaucoma the vision is severely reduced, often to light perception. The

cause of this severe loss is due primarily to the edema of the cornea, the lens, and vitreous, but increased pressure may paralyze the nerve pathway and interfere with the optic nerve fibers, interfere with the function of the rods and cones, or it may result in a nutritional disturbance of the entire retinal structure.

In acute inflammatory glaucoma, as contrasted with chronic compensated glaucoma, the increase of intraocular pressure is readily determined by palpation. The sharp increase in pressure is often found to register 70 or 80 mm. Hg. with Gradle-Schiotz tonometer.

Primary acute glaucoma is the result of a local vasomotor crisis resulting in stasis but first manifesting itself especially in an increased permeability of the capillaries of the ciliary processes. It has, for instance, long been known that acute glaucoma is characterized by an edema of the ciliary body and especially of the ciliary processes. The latter are so swollen that they often assume a wedge shape, being compressed between the equator of the lens and the posterior surface of the iris. Within the ciliary processes the capillaries are found engorged and surrounded by concentric rings of fibrin. Often small hemorrhages are found. Evidently plasma and at times whole blood has seeped out of the capillaries and, in part, clotted within the ciliary processes. The escape of serum into the interior of the eye can be demonstrated as a stainable coagulum in the vitreous and anterior chamber, and also by the numerous vacuoles in the ciliary epithelium. With the swelling of the ciliary body and processes the root of the iris is often pushed forward against the back of the cornea, obstructing the outflow angle, and the concomitant relaxation of the zonular fibres is associated with a slight anterior dislocation of the lens.

In especially severe cases necrosis of the pupillary margin of the iris is often seen. Such pressure necrosis comes about when the intraocular pressure exceeds the intracapillary pressure in the iris. However, intracapillary pressure throughout the eye normally exceeds the intraocular pressure by approximately 30 mm. of mercury. But the intraocular pressure even in acute glaucoma must be in approximate equilibrium with at least some capillary beds, and it is inconceivable that the capillary pressures within the uveal tract, all derived from the same arterial tree, should differ by such extraordinary magnitudes. The conclusion, therefore, seems inevitable that the osmotic barrier which is normally exercised against the plasma proteins has, in at least some capillary beds, disappeared and the histological appearance of the ciliary processes would lead one to locate the primary injury here.

TREATMENT

It is essential to make a differential diagnosis as oft-times an acute attack of inflammatory glaucoma is mistaken for an acute conjunctivitis or an acute iridocyclitis.

Little damage follows misdiagnosis of iritis if eserine or pilocarpine is instilled in the eye, *instead of atropine*. On the other hand, if a mistaken diagnosis of iritis is made and atropine should be instilled when the tension is already elevated with glaucoma, the result may be disastrous and may mean the destruction of the eye. There are definite symptoms for each condition as follows:

	Acute Iritis	Acute Glaucoma	Acute Conjunctivitis
Pupil	Small	Large	Normal
Congestion	Deep	Deep	Superficial
Pain	Moderately severe	Very severe	Absent or only a feeling of irritation
Tenderness	Marked	Marked	Rarely present
Secretion	Watery	Watery	Mucopurulent
Vision	Usually moderately decreased	Much decreased	Normal
Tension	Usually low	Much increased	Normal
Media	Opacities on cornea and lens capsule	Cornea steamy	Media clear
Iris	Muddy, markings indistinct	Normal or congested	Normal
Aqueous	Pus cells in iris by slit-lamp examination	No pus cells in aqueous	Normal

During an attack of acute inflammatory glaucoma, early treatment is imperative. Every hour wasted means greater loss of vision. The most accepted form of treatment is a solution of eserine sulphate one-fourth to one per cent, or a solution of pilocarpine nitrate one to five per cent, instilled into the conjunctival sac every fifteen minutes for the first three hours or until the pupil is contracted. More recently, mecholyl 20 per cent solution with prostigmine five per cent solution have been used, one drop of each drug being instilled every 15 minutes for two or three hours and then every three hours until the tension is reduced to normal or to safe limits for surgery. In the severest cases not more than 10 mg. of mecholyl in two per cent procaine may be used as a retrobulbar injection to reduce the intraocular pressure, but when mecholyl is thus given, the physician should always have 1/100 gr. of atropine sulphate at hand to give intravenously in case there is any systemic reaction. Atropine is an antidote for mecholyl.

Dehydration with 50 per cent glucose, 10 per cent hypertonic saline, or 50 per cent sorbitol, administered intravenously to the amount of 50 to 100 cc., occasionally reduces the ocular tension dramatically, but if not effective in conjunction with frequent use of miotics is rarely repeated. Dehydrating cathartics are valuable aids if given promptly. Quickest relief is afforded by posterior sclerotomy which should be employed promptly if

medical treatment does not show signs of response. A sclerotomy serves the double purpose of reducing intraocular pressure temporarily and deepening the anterior chamber.

The results of the rigorous treatment can be predicted from four to ten hours after the first instillation. If the miotics are effective, the pupil will contract eventually to 1 mm. in diameter. The anterior chamber will deepen and gradually the congestion of the eye will subside. Oftentimes the drugs are used solely as a preoperative measure to reduce intraocular pressure to normal limits as a safeguard for surgery. If there is indication that the tension is subsiding the medical treatment may be carried on for two, four, or six days. If there is no evidence of sustained relief, surgery must be undertaken at once. Graefe's classical iridectomy is the usual operation of choice for the relief of acute inflammatory glaucoma. Where the anterior chamber is still too shallow to perform a successful iridectomy, the operation may be done *ab extremo* with less danger of damage to the lens. It is best to perform the iridectomy under general anesthesia, either gas or ether, for it is almost impossible to produce local anesthesia of the highly hyperemic eye.

In all cases of acute glaucoma, miotics must be used in the fellow eye, lest the attack become bilateral. After an attack has yielded to miotic treatment the use of miotics in the affected and the fellow eye sufficient to free the iris from the chamber angle and thus favor exit of fluids from the eyes must be continued. If this treatment is ineffective, preventive iridectomy of both eyes should be performed.

CASE HISTORIES

1. *Mr. L. F.*, (Dr. Archie Olson). Male, 27 years of age. Had continuous dull headaches over the left brow for two weeks. Treatment of the nasal sinuses gave no relief. For two days the left eye was slightly red. The vision was "blurred" in the left eye. There was moderate photophobia and at times he noticed haloes.

On April 8, 1944, vision in the right eye was 20/20; vision in the left eye was 20/30. Right eye was normal; the left eye presented a slight congestion of the bulbar conjunctiva. The left pupil was sluggish and a little larger than the right pupil. Slit-lamp examination revealed early edema of the corneal epithelium of the left eye. The aqueous was clear; no K.P. were found; iris was normal. Intraocular tension (Gradle-Schiotz), right eye, 17 mgs.; left eye 49 mgs. After the instillation of three doses of 1 per cent pilocarpine nitrate tension in the left eye was 47 mgm. A solution of pilocarpine nitrate 2 per cent was prescribed to be instilled in the left eye every two hours.

On April 10, tension in the left eye remained 49 mgm. Fundus examination was negative. After the instillation of one drop of one-fourth per cent eserine the pupil was pin-point in size after one hour, and the intraocular tension was 38. Six hours later the tension was 33.

Comment: This case presents a prodromal attack of acute glaucoma in one eye. The symptoms were mild. The tension is rather high. Many cases of this type of glaucoma will be found in young adults, if the tension is carefully measured with a tonometer.

2. *Sister C.* (age 62) was first seen April 1, 1944. The left eye had been inflamed about two weeks. Some 15 years ago the patient had a similar but less marked acute episode. In the present attack, there was an occasional sharp pain, the vision was considerably blurred, the eye was red, there was no purulent discharge. On examination, the left pupil was dilated and

fixed, the anterior chamber shallow; there was considerable congestion of the eyeball, the cornea was cloudy, the fundus could not be seen, and tension was: right eye, 15 mg., left eye, 47 mg. Two per cent solution of pilocarpine nitrate was instilled every two hours for twenty-four hours followed by one per cent solution of pilocarpine every three hours for forty-eight hours. Cold packs were applied to the left eye. After forty-eight hours the pain was relieved and the congestion was considerably reduced. Slit-lamp examination then revealed a moderate aqueous flare with small, round deposits on the posterior surface of the cornea. A ring of brown pigment spots was seen on the anterior surface of the crystalline lens.

Comment: The first diagnosis in this case was an acute inflammatory glaucoma. Finally, after the symptoms had subsided and the cornea cleared sufficiently to make an examination with the slit-lamp, this case proved to be one of acute inflammatory glaucoma but an attack of acute secondary glaucoma complicating a previous iridocyclitis.

3. *Mr. C. S. C.* (Dr. H. Grant), age 78 years, retired. Patient was first seen on February 1, 1943, complaining of "infection" in the right eye. Vision in the right eye was 20/100 without glasses and 20/30 with glasses. The patient had had redness and discomfort in his left eye for about ten days, the left pupil was widely dilated and fixed and the eyeball was congested and stony-hard by palpation. Vision was blurred. Tonometeric tension was 61 mg. (Schiotz-Gradle).

A solution of pilocarpine nitrate 2 per cent with prostigmine bromide 5 per cent was instilled in the left eye. After one hour the intraocular tension was 20 in the right eye and 61 in the left eye. One-half per cent eserine ointment was prescribed to be instilled in the left eye every two hours. The following day vision in the left eye was not quite so blurred but intraocular tension remained unchanged at 61 mg. Two per cent pilocarpine nitrate solution combined with 1 per cent eserine sulphate was prescribed to be instilled in the eye every two hours. On February 6, 1943, patient was admitted to the hospital and an iris inclusion operation was performed on the left eye. Patient made an uneventful recovery. On February 25, 1943, vision in the left eye was 21/100 and the tension was markedly reduced.

March 6, 1943: Patient returned to the office presenting an acute glaucoma in the right eye. Morphine was prescribed and administered and 2 per cent eserine was used. On March 12, the right eye had responded to medication and the tension had become much lower.

June 28, 1943: Tension again increased in the right eye and an iridectomy was performed. On July 6, there was complete recovery.

Comment: An acute attack of inflammatory glaucoma of one eye was followed by a similar attack of the second eye. This patient was much older than most cases presenting acute severe glaucoma. Some response was noted by medication. The pressure was finally controlled by surgery.

3. *Mrs. C. O. M.* (48 years) came in July, 1941, with the following note from her family physician: "She has an iritis of her left eye. Treatment had consisted of 2 per cent butyne and euphthalmin 3 per cent." The left eye had been red and painful for four days and the vision was poor. Patient had noticed some dimness of vision in the left eye for six months.

Examination: Vision in the right eye was 12/100; in the left eye, light perception. The right pupil was somewhat enlarged and the anterior chamber was shallow. The left upper and lower eyelids were edematous, the conjunctiva was red and chemotic. The left pupil was dilated; the left cornea was cloudy; and the fundus could not be seen. Intraocular tension was 43 mg. (Gradle-Schiotz) in the right eye, in the left eye 74 mg. There was no relief from the pain, the congestion, and the edema after the use of pilocarpine and eserine for eight hours. Subconjunctival drainage was accomplished by a trephine operation on the left eye. The tension remained above normal in the right eye, notwithstanding the use of miotics. After three weeks, an iridencleisis was performed on the right eye.

When last seen two years later, vision in the right eye was 20/40, improved with glasses to 20/25; left eye 60/25, improved to 20/30. The intraocular tension was right eye 14 mg., left eye 17 mg.

5. *Miss S.* (age 33) was admitted to the hospital for surgical relief of an acute abdominal condition. Six days after operation the left eye became red and vision was blurred. Headache was severe, mostly on the left side. A solution of atropine sulphate 1 per cent was prescribed, one drop twice daily in both eyes, with no relief from the pain. After four days the patient was first seen by an ophthalmologist. The intraocular tension was right eye, 15 mg., left eye 50 mg. Miotics and paracentesis failed to relieve the tension or pain for six days when an iridencleisis operation was performed with complete relief of the pain. Six days later the patient was discharged from the hospital.

Comment: These two cases represent an acute attack of inflammatory glaucoma treated with cycloplegics, thereby increasing the severity of the attack. Fortunately, the cases were seen early, and the eyes were saved by surgery.

6. *Mr. H. I. P.* (aged 75) came November 1, 1943, complaining of painful inflammation of the left eye for one month. Two years previously he had a similar condition in the right eye with almost complete loss of vision temporarily. General physical examination showed a relatively high blood pressure and an enlarged prostate for which he was being treated with radiation.

Vision was reduced in the left eye to hand movements, in the right to 12/200 due to lens opacity. There was marked ciliary congestion of the left eye, the anterior chamber was obliterated, the iris was somewhat atrophic with congested blood vessels; tension in the right eye was 38 mg., in the left 81 (Gradle-Schiotz). An effort to reduce the tension of the left eye by 15 minute instillations of 1 per cent eserine was futile. Tension remained fixed at 74 mg. after twenty-four hours. Trans-illumination was normal. Examination revealed the right eye to have an immature, senile cataract with moderate cupping and paleness of the nerve, with moderate senile macular degeneration and a few colloid spots in the paracentral area. One per cent eserine ointment every six hours in the right eye reduced the tension to 20.

Under routine antisepsis, topical pontocaine anesthesia was supplemented with subconjunctival injection of cocaine over the superior rectus muscle. A keratome incision into the anterior chamber was made allowing the intraocular fluid to escape very slowly. A broad iridectomy was done with inclusion of the temporal pillar. After two weeks there was still blood in the anterior chamber and tension remained in the neighborhood of 50 mg. (Schiotz), but the pain was relieved.

Comment: This operation was unsatisfactory but was done at the patient's insistence rather than enucleation. Tension was not permanently reduced below 50 but pain and congestion were relieved. The right eye responded to treatment with 10 per cent furmethide every four hours, subsequently changed to two per cent pilocarpine with massage every four hours and the tension has remained within normal limits to date.

7. *Mrs. E. L.* (aged 46) was first seen December 4, 1932, with a history of two attacks of severe headache and almost complete loss of vision with pain in both eyes so severe her physician administered morphine with quick relief.

Vision in each eye was normal, the fields were normal; the tension was normal in each eye and there was no cupping of the optic nerves. Refraction under one-half per cent homotropine was followed by one per cent eserine and caused no symptoms until the following day when she telephoned that she was practically blind and suffering excruciating pain in each eye. Examination revealed both corneas steamy, tension in the right eye 81 mg., in the left 77 mg. (with the Schiotz-Gradle tonometer). She was immediately hospitalized and given one-fourth grain of morphine hypodermically. Five per cent pilocarpine was instilled at frequent intervals until the pupils were contracted. Her pain was relieved and the tension reduced to 15 in each eye.

This experience proved that the patient was subject to acute congestive glaucoma and with the history obtained, perhaps the

homatropine instillation for retinoscopy should have been omitted. However, it was easily controlled. No operation was done. She was given a solution of one per cent pilocarpine to instill whenever there was any complaint of haloes, eye pain or dimness of vision. She was also given a two per cent solution of eserine to instill in case pain became severe, until she could see an eye surgeon. She experienced several mild attacks at intervals during her menopause and was always relieved by instillation of one per cent pilocarpine. Intelligent cooperation was successful in obviating and preventing any serious recurrences until 1943, ten years later. During the interval several examinations revealed normal tension, normal fields of vision, and no enlargement of the blind spots nor cupping of the optic nerves. On one occasion in August, 1940, after an unusual bit of excitement and business worries she suffered an acute attack in one eye in which the tension was reported to have raised to 67. It was readily controlled with two per cent eserine and after a few hours was 17 (Schiotz).

In September, 1943, she became conscious of frequent attacks of dimness of vision with slight pain in the eyes and nausea which was always relieved by instillation of two per cent pilocarpine. Examination on September 21, 1943, showed normal vision in each eye, normal fields, no cupping of the discs but the anterior chambers were extremely shallow, the pupillary responses were normal and tension was 13 mg. in each eye. Because of her history of dimness of vision (no haloes) with pain and nausea, she was sent to the hospital for a few days of observation. Repeated tests showed that slight elevations of tension could be easily induced by excitement or by provocative tests but they were controlled by instillation of only one-half per cent solution of pilocarpine.

A long-distance message on January 23, 1944, revealed the fact that she had suffered a severe acute attack, only relieved by two per cent pilocarpine instilled frequently. The patient was in a panic. She had learned too much about glaucoma and although she knew how to control it and it had always been successfully controlled during each episode, during the intervening ten years, she asked for an operation. On January 24, 1944, a trephine sclerectomy of the left eye was done with peripheral iridectomy and on January 27, 1944, a similar procedure was carried out on the right eye. The results were perfect and there have been no subsequent attacks such as previously experienced. Also, she was greatly relieved mentally.

Comment: In this case, covering a period of ten years, attacks of glaucoma occurred at various periods, in a patient with very unstable vasomotor system starting with the menopause, usually occasioned after considerable worry or excitement, always readily controlled with pilocarpine in moderate doses. Each attack was bilateral with mistiness of vision, pain, and nausea. Only during the first and last "fulminating" attacks in 1933 and 1943 was there complete loss of vision, intense ciliary congestion and extremely high tension. The question arose as to the absolute necessity of surgical therapy under circumstances proving its ready control with mild doses of miotics and in the absence of nerve head changes or permanent field defects. The patient lived at a distance and

lost confidence in her ability to control recurrent attacks with medicine, was fearful of the consequences of glaucoma, concerning which she was well informed. Even in the absence of any cupping of the optic nerves or changes in the visual fields, we felt warranted in providing "safety valve" sclerotomies which have proved successful in maintaining control against recurrent attacks. The case is unusual in the long history, the number of mild recurrent attacks, the ease of control with medicine, and the insistence of the patient (*sic*) that some operative thing be done so that those attacks would not recur. Tension on March 23, 1944, was: right eye 17 mg., left eye 13 mg.

8. *Mrs. Mary F.* (age 68) was first seen on December 10, 1943. She had noted slight loss of vision in the right eye for twenty years. There had been complete loss of sight for the last two months. There was constant deep-seated pain around this eye. The eye had been red and congested for two weeks. The left pupil was dilated and fixed. Vision in the right eye was 20/20; vision in the left eye was light perception. The conjunctival vessels of the left eye were engorged, the anterior chamber was deep, there was no edema of the cornea, the crystalline lens was opaque, and the fundus could not be seen. The intraocular tension of the right eye was 17 mg.; left eye 88 mg. The patient was taking a great deal of aspirin to relieve the pain in the left eye and had been unable to sleep for the past two weeks. A solution of eserine sulphate one-fourth per cent was prescribed for her to instill in the eye every three hours. After four days treatment of the left eye with miotics, intraocular tension was as follows: right eye 18 mg., left eye 71 mg. Pain was becoming more severe and evisceration was performed. A report of the eviscerated material was as follows: "Melanoma of the eye, histological grade III."

Comment: In every case of acute inflammatory glaucoma in which the fundus cannot be seen and where there is no reduction of intraocular pressure by treatment with miotics, the presence of an intraocular tumor must always be borne in mind. Transillumination may help to determine the presence or absence of such a tumor.

SUMMARY

Acute congestive glaucoma is characterized by sudden and severe pain in the eye, radiating throughout the head. The eyeball is red and congested, the lids may become edematous, the cornea is characteristically steamy, the anterior chamber is shallow, and the pupil is dilated and fixed.

Differential diagnosis between acute glaucoma, iritis, and acute conjunctival inflammation is demonstrated.

Prompt and energetic treatment, both medically and surgically, must be instituted without delay. It is always dangerous to temporize. Atropine should never be prescribed until a definite diagnosis has been made and an indication for its use is established.

American Student Health Association News-Letter and Digest of Medical News

Dr. M. W. Husband, formerly director of Student Health Service at Kansas State College, Manhattan, Kansas, is on leave of absence and is now stationed at the Naval Hospital, San Diego, California, with the rank of Lieutenant Commander. During Dr. Husband's absence, Dr. Robert R. Snook will be acting director of the Student Health Service.

Dr. Raymond C. Bull has retired as director of the Students' Health Service of Lehigh University, Bethlehem, Pennsylvania, as of July 1, 1944. The new director is Dr. C. O. Keck.

Feeding Habits of Mosquito Vectors of Encephalitis. Reeves and Hammon in the March, 1944, issue of the *American Journal of Tropical Medicine* report making precipitin tests on blood-engorged mosquitoes collected in domestic habitats in the Yakima Valley, Washington. The tests revealed that *Culex tarsalis* fed frequently on domestic fowl as well as common domestic animals and man. This fact, coupled with the fact that encephalitis virus has frequently been isolated from *Culex tarsalis*, gives strong support to the belief that domestic fowl are an important reservoir of encephalitis virus in the Yakima valley.

Stability of Penicillin Solutions. William M. M. Kirby in the July 1, 1944, issue of the *J.A.M.A.* summarizes his recent study of the stability of penicillin solutions at room and incubator temperatures as follows: "Solutions of current commercial preparations of the sodium salt of penicillin have been found to maintain their full potency for a minimum of four days in the incubator and seven days at room temperature, in contrast to the relative instability of the early cruder lots. These observations indicate that one or two day's supply can be mixed and left at the patient's bedside without danger of deterioration."

Tobacco Smoking and Pulmonary Complications after Operation. In the *Lancet* of March 18, 1944, H. J. V. Morton reports that for all types of abdominal operations the morbidity rate for smokers using more than 10 cigarettes a day is about six times that for non-smokers. The incidence of bronchitis, atelectasis and bronchopneumonia after abdominal operations and "gas-oxygen-ether" in 1257 adults was studied. The author warns that when abdominal operations are contemplated it is advisable for smokers to stop or reduce their smoking as a precaution against pulmonary complications.

Meningococcic Meningitis in the U. S. in 1943. According to Public Health Reports 1943 showed the highest incidence of meningococcic meningitis for any year since the morbidity figures for this disease have been collected (since 1914). Preliminary reports show that 17,974 cases were reported, a rate of 13.4 per 100,000 for forty-eight states and the District of Columbia. The highest previous rate reported was 8.7 per 100,000 in 1929.

Methyl Bromide Poisoning. The use of methyl bromide as an insecticide, particularly for the extermination

of lice and bedbugs, has been rapidly developing in the armed services and the War Production Board has recently announced that this gas has been placed under allocation. The report of Russell N. De Jong (*J.A.M.A.*, July 8, 1944) of 3 cases of methyl bromide poisoning is therefore of considerable interest. All three cases were in workers employed in the production of the gas. The author concludes "While it (methyl bromide) can be handled without injury if used intelligently, its toxic potentialities must be borne in mind, and its indiscriminate and careless use must be avoided."

Physician Population in U. S. Increased by 2570 in 1943. According to the 42nd compilation of medical licensure and allied statistics by the Council on Medical Education and Hospitals of the American Medical Association (*J.A.M.A.*, May 13, 1944) there were 5952 additions to the medical profession and 3382 deaths of physicians in the U. S. this past year. The net increase in the number of physicians was therefore 2570. Estimated figures indicate that on Feb. 1, 1944, the number of physicians in Continental U. S. was 186,496, of which approximately 100,000 were engaged in the private practice of medicine. Some of the latter are doing part-time teaching as well as practice.

Lack of "Hereditary Transmission" of Cancer. In a study of 121 married couples both of whom had cancer, Hanhart (*Schweizeresche medizinische Wochenschrift* as abstracted in July 22, 1944, issue of the *J.A.M.A.*) found only 30 couples who produced children who developed cancer. Of the 590 children of these 121 cancerous couples, 359 lived to be over 40 years of age, 286 lived to be over 50, and 188 lived to be over 60. Only 43 of the children developed cancer, 26 men and 17 women. Two developed cancer in their forties, three in their fifties, eleven in their sixties and twenty-seven in their seventies. The average cancer expectancy of the 286 children who lived beyond the age of 50 years was around 13 per cent while the cancer expectancy of the city of Zurich (about 320,000 people) was 20 per cent. This study would appear to indicate that there is no specific hereditary predisposition to cancer.

The Effect of Digitalis on the Clotting Mechanism. In the July 22, 1944, issue of the *J.A.M.* de Takats, Trump and Gilbert present evidence from clinical observations, clinical studies and animal experiments that the use of digitalis in therapeutic doses favors the tendency to thrombosis. The authors point out that this effect is most significant in patients in whom other factors such as stasis and infection are already operating. As well as heparin and dicumarol, the authors suggest sodium tetrathionate as useful in opposing the thrombogenic property of digitalis.

Prophylaxis of Spotted Fever. In a letter to the *Journal of the American Medical Association* (July 29, 1944, issue) Armstrong and Topping state several reasons why the recent observation of Anigstein, Bader, Young, and Neubauer (as to the efficacy of local infiltration of the site about tick bites with immune spotted fever serum) will likely have but little clinical application.

The JOURNAL LANCET

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MINNEAPOLIS, MINNESOTA, SEPTEMBER, 1944

IMPORTANCE OF Rh FACTOR DETERMINATIONS

Work done by the Nobel Prize winner, Karl Landsteiner, about ten years ago gave to the scientific world the discovery of a substance called the Rh factor, not because it had anything to do with the element Rhodium whose chemical symbol is the same but because it was first found in the blood of the Rhesus monkey after a series of injections of that monkey's blood into rabbits. Serum from the blood of the injected rabbits was found to clump the red cells of the monkey as well as 85 per cent of the red cells of humans, from which it was assumed that there was a common antigenic factor in the same proportion. It was then possible to produce an immune serum from the rabbit's blood which differentiated human beings into two groups, the 85 per cent having the positive factor belong to the Rh+ and the remaining 15 per cent designated as Rh—.

Preliminary tests to determine the Rh factor prevent

reactions and must for safety's sake be made in all cases requiring repeated transfusions of blood, a procedure that has become exceedingly common. Yannet and Lieberman have begun a study of the possible relationship of the Rh factor to mental deficiency. Falkenstein has contributed some observations on the Rh factor in intragroup transfusion reactions and erythroblastosis fetalis. Dr. Birger Broman of the Carolinian Hospital in Stockholm, Sweden, has recently been applying the Rh blood grouping principles with success in the treatment of the otherwise fatal form of icterus neonatorum. Over 1000 children have been treated during his investigation in which he found that death in this condition was caused by the fact that the mother lacked the Rh group while the baby possessed it. His study of the Rh group has also thrown light on the hitherto inexplicable complications in connection with blood transfusions of persons who have been in need of repeated blood replenishment.

A.E.H.

DOCTOR TAKE A VACATION!

No group of persons—not even ministers—so rarely practice what they preach as do doctors. Is there a doctor alive who has not said to a patient something like this: "What you need, old man, is a vacation. Get out in the woods, go fishing, hunting, exploring. Afraid of what will happen to your business? Okay, but have you thought what will happen to it if you drop dead some day? etc., etc." Yet today thousands of doctors all over the country are saying to their wives, "Yes, of course I need a vacation. You needn't rub it in. Sure I promised to let up a little when I got past fifty, but this is war. What will happen to my patients if I go off?" And if she is a hardy soul she comes back with "That's what Dr. X said to his wife and where is he now?" That jolts him a bit, but doctors like other men, turn a deaf ear to wifely warnings. Besides she doesn't understand. A fat chance he has for a vacation!

Everybody knows how gallantly the older medical men have risen to this war emergency, that they are giving unsparingly of their time and strength. Their contribution may be less dramatic than that of the younger member of the fraternity at the front, but it is no less patriotic. And it is gratifying to know that you are more important to your fellows than ever before, especially gratifying when you have reached the age when you suspect that younger men will soon threaten your prestige and when geriatrics begins to take on a personal significance. And so the doctor carries on day after day tapping every ounce of his reserve strength, ignoring little warning signals, concealing his tension and his fatigue—at least until he is back in the bosom of his family. (What are families for, anyhow, if one can't unload the day's frustrations and irritations on them?)

It is time to be realistic about this vacation business. Every doctor worth his salt has had to work too hard this past year. The coming year may well be still harder. He needs a vacation now as he never has before and he owes it not only, to himself, but to his patients and to his country. With the present scarcity of medical men and the diminishing number of medical students, the U.S.A. cannot afford to lose the services of a single doctor. A vacation now may bring temporary hardship to his patients and it may seem impossible to arrange. But in the long run the community will benefit, for it will mean more efficient service from a doctor who is quickened and refreshed and one who has stored up reserves for the future; it may even mean a prolonging of a useful life.

Fall is here, the most perfect time of the year in our northwest. Minnesota lakes and woods are at their best. Flies and gnats have disappeared. The days are blue and gold, the nights cool and spicy. Fish, birds and beasts wait to be killed. If you are not of the killing fraternity you can take a canoe and a guide and travel through the waters of Superior National Forest up into Canada without seeing a soul or retracing your steps. You will come back with a clearer head, a renewed spirit, and more morale than you ever had in your life. So take a vacation, doctor. The country needs you, but it needs you well and vigorous.

M. U.

Correspondence on an Obstetrical Experience; from a Reader somewhere in New Guinea*

DEAR LITZ:

It will tickle you to hear that I have had a chance to do some Ob. & Gyn. out here. I was called to the beach by the native medical practitioner to see a native girl in labor. These native M.P.'s have had about five years' experience in a hospital at Port Moresby, before returning to practice in their own villages. The patient was a native girl about 12 years old who had been in labor three days and the parents and relatives were all worried. Went up to the village hospital by river part way in a small boat, which was made of hollowed-out logs with a balance log to keep it from tipping. After landing, I was led up a path through long grass to the village hospital. Although there is an excellent native hospital in this area, this one was really primitive. The ordinary village huts are built high off the ground, completely covered, with no windows and no lights. The family and relatives were gathered about the hut, silently glancing at the strangers, two other officers and I and the native M.P.

Having with me only sterile gloves and Ky jelly, the N.M.P. said I might examine the patient but he would not go into the hut with me. Stepping through the thatched door, I had to wait fully five minutes to accommodate my eyes. When accustomed to the darkness, I found myself with a patient lying on a mat on the ground and a midwife and evidently, grandmother. No table in the room, no chairs and no outcries from the patient. I took the patient's pulse which was 140 but she seemed well hydrated. She seemed no more than a child of nine years by our standards and very frightened. Evidently no examinations of patients in labor are ever made, for as I put on a sterile glove for digital rectal examination, the patient hunched up in the corner and refused to cooperate. However, after help from the midwife, I examined the patient and found the head at the spines and two centimeters dilatation. She was evidently not in true labor or had secondary inertia. The pains, however, had become regular and I walked outside the hut and quieted the fears of the parents with some difficulty, but I'm not sure they understood, by telling them she was O.K.—a word evidently universally understood. We left, promising to return in the evening about 13:00 and on arrival about 19:00 that same evening all were smiling and going happily about their tasks of cooking rice and tara (looks like rutabagas but longer root). The N.M.P. said things were going well now and that I might go into the labor room. After again getting accustomed to the light, I saw a strange scene. The patient, with her wrists tied together, was in a sitting position, with feet braced against the wall. The midwife was seated with legs and arms in piggy-back fashion, holding a cloth just above the fundus. The grandmother was seated to the side of the patient, wiping up blood and amniotic fluid with waste material made of the outer covering of coconuts, a brown fuzzy material that effectively sopped up debris. With each pain, the patient

*Letter which we are privileged to publish from Lt. Ray F. Cochrane, MC, USNR, of Minneapolis, to his associate, Dr. Jennings C. Litzberg, also of Minneapolis.

would pull on the thongs and the midwife would tighten the bandage, thus increasing extraabdominal pressure. No outcries or words of any kind were spoken; but what an efficient mechanism of labor! Soon the baby (a girl weighing approximately five pounds) was born and left to lie on the mat while the mother and midwife waited for labor pains to expel the placenta. This took about 15 minutes, with no attention to the baby, meanwhile. Soon baby started to cry, and, with the afterbirth delivered, the cord was tied with what appeared to be a piece of straw—then severed with a sharp shell. The ordeal was over and the baby placed in a crib of thatched palm fronds. With things going so well, I went outside the hut, feeling that if nothing else happened out here, the experience had been worth the trip. I tried to ask all the questions I could, what of a mother who bled excessively before delivery, what if she were torn, what about postpartum hemorrhage, but they evidently did not understand. Evidently a native is left to her own; no prepartum exams as to size of pelvis, no B.P. or urinalysis. I'm not so sure but that, barring the things we can do, such as good prophylactic prenatal care, prevention of infection and control of hemorrhages, they get along very well with little interference with nature.

The husband couldn't have been more than 16 years of age but was very pleased with himself. The family wanted to give me something but the only things I have are some "cats-eyes" shells, which are very popular in barter out here and are mounted in rings, bracelets, or necklaces. I often wished I had had an interpreter to gather more information about the obstetric care but wouldn't have missed that consultation for anything.

Sincerely, RAY.

CORRECTION!

Page 283, August issue, Fig. 3: For 75° C. read 15° C.

News Items

Dr. Joseph F. Malloy, recently given a medical discharge in the navy, has returned to Yankton, South Dakota, after a seventeen months' service in the Pacific and will resume active practice.

Dr. William W. Holleman, who has been practicing medicine in Corsica, South Dakota, for the past ten years, has become associated with Dr. Walter A. Dawley and Dr. Donald L. Kegaries of Rapid City. Dr. Holleman was graduated in 1933 from the medical school of the university of Illinois.

Drs. Alfred N. Smith, Chester W. Lawson and Robt. Ryde of Glasgow, Montana, have formed a partnership and will continue an office established fifty-three years ago by Dr. Mark D. Hoyt who died in 1941.

Dr. Alex J. Otten, McCloud, California, graduate of the university of North Dakota and Northwestern university, has opened an office at Grand Forks, North Dakota.

Dr. William A. Meadows has left Shelby and Sunburst, Montana, for Lockport, Illinois, where he will be plant physician for the Texas Refining Co.

Dr. Gail Rebecca Broberg and Dr. Donald O. Manshardt have been added to the Fargo Clinic staff. Dr. Broberg is the daughter of the retired physician Dr. J. A. Broberg of Blue Earth, Minnesota, and Neenah, Wisconsin. She received her M.D. degree at the university of Michigan and has taken postgraduate work in Stockholm, Sweden, and in Oslo, Norway. She comes to the clinic from Los Angeles where she has been associated with the Ross-Loos group. Dr. Manshardt will head the pathology of the clinic and will be pathologist for St. Luke's and for St. John's hospitals. He was graduated from Northwestern university, has taught pathology there, and has been associated with Cook county hospital, Chicago, and several other hospitals of note.

Dr. H. L. Casebeer, widely known in Butte, Montana, as a physician and aviator, was elected recently a member of the board of directors of the Butte chamber of commerce.

Dr. F. W. Haas, assistant superintendent of the state hospital at Yankton, South Dakota, was appointed by Governor Sharpe to the commission for the control of the feeble-minded, to succeed Dr. Geo. S. Adams, deceased.

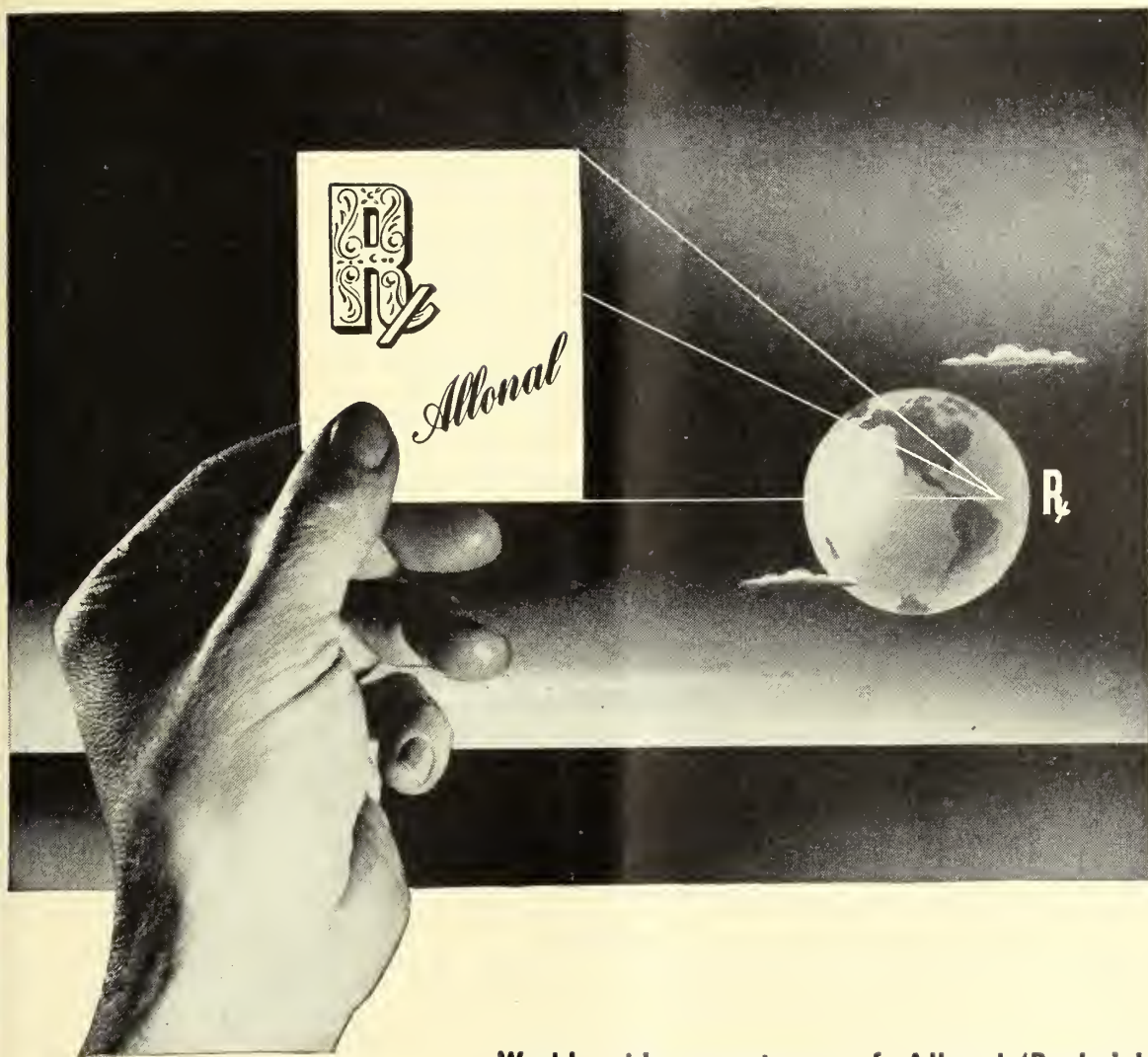
Dr. Herman E. Hilleboe, former medical unit chief with the Minnesota state division of social welfare, has been named chief of the tuberculosis division of United States public health service, a newly created post. Since 1942 Dr. Hilleboe has directed federal tuberculosis control activities. He was with the Minnesota organization from 1939 to 1943.

Dr. O. J. Hagen, A.M., M.D., L.L.D., F.A.D.S., of Moorhead, Minnesota, was elected Regent of District No. 13 and delegate to the national assembly and a member of the board of governors of the International College of Surgeons at its meeting in Philadelphia, December 19, 1943.

Future Meetings

The Northwestern Pediatric Society Fall Meeting will be held September 29th, 30th. Opening session at White Pine Inn, Bayport, Minnesota. Member speakers: Drs. Roy N. Andrews, Mankato, Minnesota; Harry Murphy, Omaha, Nebraska; R. Jensen and F. Adams, Minneapolis; E. Harris, Minneapolis; F. C. Rodda, Minneapolis; George L. Robertson, Omaha; L. F. Richdorf, Minneapolis; Erling Platou, Minneapolis; Paul Bancroft, Lincoln, Nebraska; E. C. Lowry, Minneapolis; Joseph T. Cohen, Minneapolis; Paul Dwan, Minneapolis. Guest speaker, Dr. Arild E. Hansen, Galveston, Texas, "Problems of Lipid Metabolism in Pediatrics," 4 p. m., followed by informal hour, dinner and a short business session.

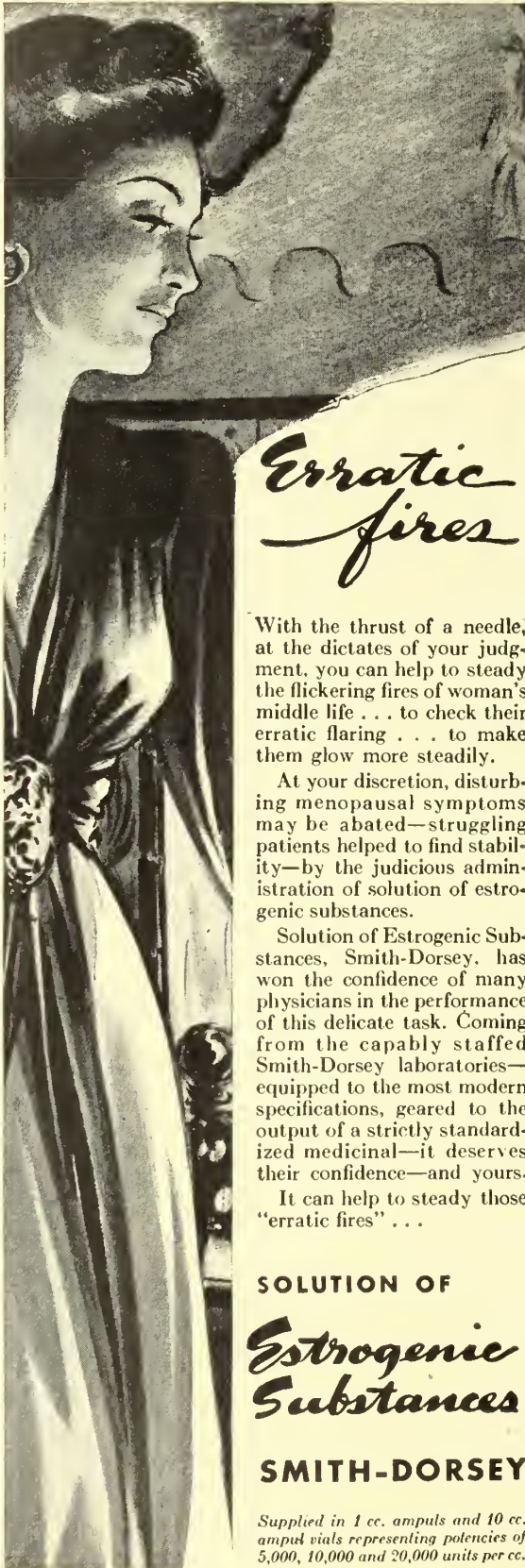
Second day session at Eustis amphitheatre, University Hospital, Minneapolis. Speakers: Drs. E. M. Schleicher, Minneapolis; Richard Tudor, Minneapolis; Robert Bergen, Minneapolis, followed by a presentation of cases by the pediatric staff of the University of Minnesota Hospital.



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Necrology

Dr. George Sheldon Adams, 67, Yankton, South Dakota, died July 28 at his home after an illness of many months. Dr. Adams for twenty-four years had been superintendent of the Yankton state hospital and was widely known throughout the state as a physician and psychiatrist. He was a member of the American Psychiatric society and a 33rd degree Mason.

Dr. James R. McHugh, 86, of the Big Stone and Ortonville communities, Minnesota, died at his home in Ortonville August 4.

Dr. Edward C. Gager, 62, St. Paul, Minnesota, died at Bethesda hospital August 4, after a three-day illness.

Dr. William B. Holt, 46, Minneapolis, died July 26, in Oak Ridge, Tennessee. Dr. Holt was a member of the staff of St. Barnabas hospital for many years.

Ending a long career of service in the medical profession and a life devoted to his fellow men, Dr. Horace Watson Sherwood, 78 year old physician of Doland, South Dakota, passed away Saturday, August 5, at 7:40 P. M., at the home of his son, Dr. C. E. Sherwood, where he has been receiving care since his return from Arizona in May. Death was the result of a paralytic stroke.

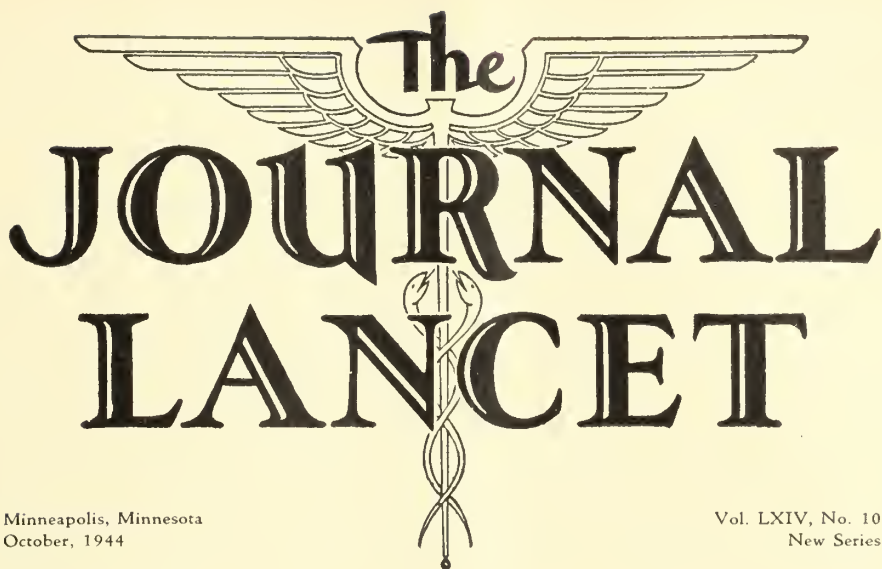
Dr. Sherwood had practiced medicine in Doland from 1902 until last fall when he retired and went to Arizona to spend the winter with his daughter. He was a member of the Watertown district medical society and of the South Dakota and American medical associations. For many years he was councilor of the second district of the association. He was also active in the Methodist church and served for many years on the official board of the church and superintendent of the Sunday school. He was a member of the board of education of Doland for several years. Dr. Sherwood was active in the Masonic lodge and in the Eastern Star.

H. W. Sherwood was born in Kalida, Ohio, May 14, 1866. The family moved to southern Ohio when he was a small child. After completing his work in the public schools he attended the Fayette (Ohio) state normal school from which he was graduated with a B.S. degree in 1892. It was there that he met Mary J. Camp, who became his wife on August 11, 1891.

In the fall of 1892 he entered the college of medicine at the university of Michigan, Ann Arbor, and graduated with his M.D. degree in 1896.

Dr. John Samuel Whitson, 76, died August 6, at his home in Enderlin, North Dakota, after a long illness. Dr. Whitson was graduated from Rush medical school in 1895 and practiced in Indiana for twenty years after which he came to North Dakota. He had practiced at Charlson, Streeter, Enderlin, Hannaford, and Tappen.

Dr. Gaylord Worstell, 81, Big Sandy, Montana, died August 11, after a prolonged illness. Dr. Worstell was a distinguished Lincoln student and a recognized authority on Montana pioneer history. He practiced in Chouteau county for 34 years, specializing in surgery and obstetrics.



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Transactions of the Montana State Medical Association

Sixty-sixth Annual Session
Butte, Montana
July 13 and 14, 1944

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MEDICAL PUBLICATIONS COMMITTEE (1 year)	
A. R. FOSS (chairman), Missoula	(1945)
A. J. KARSTED, Butte	(1945)
S. A. COONEY, Helena	(1945)
MEDICAL ECONOMICS COMMITTEE (3 years)	
J. H. GARBERTSON (chairman), Miles City	(1947)
M. A. SHILLINGTON, Glendive	(1946)
R. B. DURIN, Great Falls	(1946)
H. T. CARAWAY, Billings	(1947)
F. F. ATTIX, Lewistown	(1946)
POSTGRADUATE COMMITTEE (1 year)	
F. R. SCHEMM (chairman), Great Falls	(1945)
S. V. WILKING, Butte	(1945)
A. R. KINTNER, Missoula	(1945)
FRACTURES COMMITTEE	
S. L. ODGERS (chairman), Butte	(1945)
T. B. MOORE, JR., Kalispell	(1945)
I. A. ALLRED, Great Falls	(1945)
H. J. HALL, Missoula	(1945)
D. J. COOPER, Big Sandy	(1945)
TUBERCULOSIS COMMITTEE (1 year)	
F. I. TERRILL (chairman), Galen	(1945)
F. J. HAMERNIK, Crow Agency	(1945)
E. M. LARSON, Great Falls	(1945)
J. L. MONDLOCH, Butte	(1945)
W. GORDON, Billings	(1945)
ADVISORY BOARD WOMEN'S AUXILIARY (3 years)	
J. P. RITCHEY (chairman)	Missoula
E. D. HITCHCOCK	Great Falls
E. S. MC MAHON	Butte
C. H. NELSON	Billings
D. T. BERG	Helena
INDUSTRIAL HYGIENE COMMITTEE (3 years)	
A. T. HAAS (chairman), Missoula	(1946)
HAROLD SCHWARTZ, Butte	(1946)
J. B. FRISBEE, Butte	(1946)
L. M. FARNER, Helena	(1946)
MEDICAL MILITARY PREPAREDNESS AND DEFENSE ACTIVITY COMMITTEE (1 year)	
F. L. ANDREWS (chairman), Great Falls	(1945)
R. V. MORLEDGE, Billings	(1945)
W. A. LACEY, Havre	(1945)
F. L. UNMACK, Deer Lodge	(1945)
J. G. LAPIERRE, Butte	(1945)
ROCKY MOUNTAIN CONFERENCE COMMITTEE (1 appointed each year; 5 year term)	
T. F. WALKER (chairman), Great Falls	(1945)
R. W. MORRIS, Helena	(1949)
H. W. GREGG, Butte	(1948)
C. H. NELSON, Billings	(1946)
J. R. SOLTERO, Lewistown	(1947)
NOMINATING COMMITTEE	
F. F. ATTIX (chairman), Lewistown	(1945)
L. G. DUNLAP, Anaconda	(1945)
H. T. CARAWAY, Billings	(1945)
MATERNAL AND CHILD WELFARE COMMITTEE (3 years)	
F. L. MC PHAIL (chairman), Great Falls	(1947)
D. L. GILLESPIE, Butte	(1947)
G. A. CARMICHAEL, Butte	(1946)
T. L. HAWKINS, Helena	(1947)
L. W. BREWER, Missoula	(1945)
P. L. ENEBOE, Bozeman	(1946)
E. A. HAGMANN, Billings	(1947)
R. L. TOWNE, Kalispell	(1947)
W. A. MEADOWS, Sunburst	(1946)
A. L. GLEASON, Great Falls	(1946)
B. C. FARRAND, Jordan	(1946)
E. A. WELDEN, Lewistown	(1946)
J. DIMON, Polson	(1946)
MAUDE M. GERDES, Billings	(1945)
STATE INSTITUTIONS COMMITTEE	
HAROLD GREGG (chairman), Butte	(1945)
W. E. LONG, Anaconda	(1945)
J. I. WERNHAM, Billings	(1945)
REHABILITATION COMMITTEE	
F. F. ATTIX (chairman), Lewistown	(1945)
R. B. DURIN, Great Falls	(1945)
J. K. COLMAN, Butte	(1945)
F. I. TERRILL, Galen	(1945)
R. M. MORGAN, Helena	(1945)
STATE DISTRICT COMMITTEE FOR SPECIAL BUSINESS	
E. M. LARSON (chairman)	Great Falls
M. A. SHILLINGTON	Glendive
H. T. CARAWAY	Billings
P. E. KANE	Butte
W. N. MC PHAIL	Missoula
T. B. MOORE	Kalispell
J. M. FLINN	Helena
ANNUAL MEETING OF THE COUNCIL OF THE MONTANA STATE MEDICAL ASSOCIATION July 12, 1944	
The meeting of the council of the Montana state medical association was called to order by Vice President M. G. Danskin at the Finlen Hotel in Butte Wednesday, July 12, at 8:30 P. M. The following councilors were present: Drs. J. H. Garbertson, A. D. Brewer, J. H. Irwin, A. C. Knight, S. A. Cooney, H. W. Gregg, and A. R. Foss.	
The council chose Dr. J. H. Irwin as chairman. Minutes of the last meeting, having been published in the JOURNAL-LANCET, were approved as published without reading. The secretary made his annual report, a copy of which is included in these minutes. Upon motion regularly made, duly seconded, and unanimously carried, the report was accepted.	
Dr. Irwin appointed Drs. A. R. Foss, A. D. Brewer, and H. W. Gregg an auditing committee to audit the books of the association. Dr. S. A. Cooney submitted an itemized bill for \$405.18 as expenses of the committee appointed to secure the withdrawal of names from the petition circulated by the osteopaths. Dr. Cooney had paid the various items personally. It was regularly moved, duly seconded, and unanimously carried that the council recommend to the House of Delegates that this bill, as itemized below, be paid.	
Clerical Hire:	
Mrs. Hawkins	\$149.50
Dr. Flinn	20.30
Margaret Ann Tobin	3.00
Edith Tongren	3.00
Dorothy Clements	25.00
Mrs. Thomas	5.00
Dr. Knight	25.00
Printing—State Publishing	50.60
Stamps	30.00
Telephone	35.93
Paper and carbon	6.50
Telegram	.75
Taxi	.60
Publicity	50.00
	\$405.18
It was regularly moved, duly seconded, and unanimously carried that Mr. Toomey be retained as counsel for the association for the year beginning January 1, 1945, at a fee of \$300.00.	
A discussion of the matter of a full-time secretary took place but no action was taken.	
There being no further action to come before the council the meeting adjourned.	

SECRETARY'S REPORT TO THE COUNCIL

The membership of the Montana state medical association is now 444. Of these members 107 are in the armed forces, and, hence, are exempt from the payment of dues. Of the members not exempt from payment of dues 259 have paid their dues to date. There is no doubt the majority of those whose dues yet remain unpaid will pay them before the end of the year.

I am herewith submitting an audit report of the medical association for the period June 22, 1943, to July 7, 1944. This report was prepared by Mr. William B. Fin'ay, certified public accountant, of Great Falls, Montana, and I respectfully request that the same be made a part of this report and be incorporated in the minutes.

During the year your secretary took advantage of the permission granted some time over one year ago by the council to sell our United State Treasury bond when, in his opinion, sufficient profit to justify its sale could be secured. For this \$5,000 bond we received \$5,582.91, being a net profit of \$582.91. With the proceeds of this bond we purchased United States Treasury bonds of 1964 to 1969 to the value of \$5,000. To the profit secured from the sale of these bonds was added sufficient funds from the general funds to take up the note for \$1,000 held by the Great Falls National Bank. This note was to cover a loan of \$1,000 borrowed for the purpose of making a loan to the hospital service association. The amount of cash on hand, it will be noted, is now \$2,060.22 as compared with \$2,040.12 a year ago. Therefore, the condition of the treasury is essentially as it was a year ago, except for a reduction of \$1,000 in our indebtedness. We still hold a promissory note from the hospital service association for \$1,000.

The matter of the state journal need not be discussed at this meeting since our contract with the JOURNAL-LANCET of Minneapolis has not yet expired.

At a meeting of the executive committee held in Helena, Montana, June 24, 1944, it was recommended that the council authorize the expenditure of not over \$500 by the committee appointed to attempt to defeat the measure initiated by the osteopaths by securing a withdrawal of names.

No new societies have been chartered during the past year, nor have any of the societies gone out of existence.

The matter of employing counsel for the year beginning January 1, 1945, is now before the council.

It is possible that the House of Delegates may at this meeting wish to consult with the council regarding a further increase in dues. Should such be the case, it will probably be possible to secure such a meeting before the adjournment of our annual session.

THOMAS F. WALKER, M.D., *Secretary.*

FINANCIAL REPORT

June 23, 1943, to July 7, 1944, Inclusive

Receipts	
June 22, 1943, Balance of cash on deposit in	
Great Falls National Bank	\$2,040.12
Add:	
Cascade County Medical Society	\$ 350.00
Chouteau County Medical Society	40.00
Fergus County Medical Society	90.00
Flathead County Medical Society	180.00
Hill County Medical Society	50.00
Lake County Medical Society	20.00
Lewis & Clark County Medical Society	190.00
Madison County Medical Society	50.00
Mount Powell Medical Society	200.00
Musselshell County Medical Society	50.00
Northcentral Montana Medical Society	136.00
Northeastern Montana Medical Society	180.00
Park-Sweetgrass Medical Society	90.00
Silver Bow County Medical Society	440.00
Southeastern Montana Medical Society	280.00
Western Montana Medical Society	330.00
Yellowstone Valley Medical Society	450.00
Interest on government bonds	811.52
Sale of U. S. Treasury Bond, No. 16127H	5,000.00
Refund, traveling expenses	
(Dr. T. F. Walker)	125.96

Refund, 1943 meeting expenses		46.04
(Dr. E. T. Bell)		46.04
Total Receipts		9,109.52
TOTAL TO BE ACCOUNTED FOR \$11,149.64		
Disbursements		
Secretary's salary	\$	600.00 ¹
Stenographer's salary		60.00 ¹
Telephone and telegraph		171.70
Supplies and expense		90.26
Bank charges		6.26
Flowers		20.00
1943 Annual Convention		373.94
1944 Annual Convention		29.00
Legislative expense		98.00
Refund of dues:		
Silver Bow County Medical Society	\$2.00	
Mount Powell Medical Society	10.00	
Northcentral Montana	10.00	
		22.00
Subscription, THE JOURNAL-LANCET		436.25
President's Address,		
THE JOURNAL-LANCET		8.37
Secretary's bond		20.00
Attorney's retainer for 1944, Toomey,		
McFarland and Chapman		300.00
Attorney's fees, Paul Keller		200.00
Auditing fees, 1941-42,		
Wm. B. Fin'ay, C.P.A.		75.00
Repayment of note, Great Falls Nat. Bank	1,000.00	
Interest paid		24.04
Postage		24.04
Safety deposit box rental		3.00
Delegate to American Medical Association		151.00
Traveling and other exp. of officers, Medical Economics and Executive committees		378.67
Purchase of five \$1,000 2½% Treasury		
Bonds of 1964-69 plus accrued interest		5,004.42
TOTAL DISBURSEMENTS		\$9,069.55
Balance of cash on deposit in Great Falls		
National Bank, July 7, 1944		2,053.09
TOTAL ACCOUNTED FOR		\$11,149.64

¹Secretary's and stenographer's salary amounting to \$55.00 for the month of June, 1944, has not been paid.

Reconciliation of Account with the Great Falls National Bank, Great Falls, Montana (July 7, 1944)

Balance as per bank statement, July 7, 1944	\$ 2,062.22
Less: Outstanding checks, viz.:	
June 9, 1944, Joyce Knudsen, Ck. 347	\$5.00
July 7, 1944, Western Union, Ck. 350	4.13
	9.13

BALANCE AS PER CASH BOOK, July 7, 1944 \$ 2,053.09

Investment Account		
NEGOTIABLE PROMISSORY NOTE—		
Hospital Service Association of Montana, dated July 24, 1941, due on demand with interest at 6% \$1,000.00		
2½% TREASURY BONDS of 1964-69:		
	Par Value	Accrued Interest
No. 16644D	\$1,000.00	\$18.72
No. 16643C	1,000.00	18.72
No. 16642B	1,000.00	18.72
No. 16641A	1,000.00	18.72
No. 16645E	1,000.00	18.72
TOTALS	\$5,000.00	\$93.60

EQUIPMENT:	
Viewing Box (purchased July 13, 1942)	\$81.64
Secretary-Treasurer's Fidelity Bond	
Thomas F. Walker, M.D., Great Falls	\$4,000.00
THOMAS F. WALKER, M.D., <i>Secy.-Treas.</i>	

PROCEEDINGS
of the
HOUSE OF DELEGATES
SIXTY-SIXTH ANNUAL MEETING
of the
MONTANA STATE MEDICAL ASSOCIATION

Thursday, July 13, 1944

This session of the House of Delegates was held in the Finlen Hotel in Butte, Montana, July 13th and 14th, 1944. The session was called to order at 8:00 A. M. Thursday, July 13, by Vice President Dr. M. G. Danskin. A roll call of delegates showed present the following delegates:

Chouteau County—None.
Cascade County—Drs. E. M. Larson, R. B. Durnin, H. W. Fuller, F. D. Hurd, C. F. Little.
Gallatin County—Dr. E. R. Grigg.
Hill County—Dr. Wm. A. Lacey.
Fergus County—Drs. F. F. Attix, J. J. Elliott.
Flathead County—Drs. T. B. Moore, Jr., A. A. Dodge.
Lake County—None.
Mount Powell—Drs. W. E. Long, L. G. Dunlap.
Northcentral—Dr. W. L. DuBois.
Northeastern—Drs. C. W. Lawson, R. D. Knapp.
Park-Sweetgrass—None.
Silver Bow County—Drs. R. C. Monahan, R. F. Peterson, A. Karsted.
Southeastern Montana—Drs. B. C. Farrand, M. A. Shillington, J. H. Garberson.
Madison County—Dr. R. B. Farnsworth.
Lewis & Clark County—Drs. D. T. Berg, S. A. Cooney.
Western Montana—Drs. Allen Foss, H. M. Blegen, J. M. Nelson, C. L. Farabaugh.
Yellowstone Valley—Drs. H. T. Caraway, J. I. Wernham.

A majority of the delegates being present, the House of Delegates proceeded with the business of the association. Dr. Danskin read the following message from President Dr. J. P. Ritchey, who, on account of illness, could not be present:
"Members of the House of Delegates: Greetings:

I should like to mention a few matters of paramount importance among the many which are up for your consideration:

I. It has become obvious that the necessary work of the secretary's office has increased in scope far beyond the possibility of handling it on a part-time basis. I hope the House of Delegates will provide for the employment of a properly qualified full-time lay secretary to work under the physician-secretary as soon as one can be secured.

II. Ought not our association in some way to provide medical care on a pre-payment basis for every person in Montana who needs and wishes it? I ask the House of Delegates to support the economics committee in its diligent efforts to find ways and means to this end, and I express my conviction that this matter is compellingly urgent in point of time.

III. I hope the House of Delegates, as requested by the American Medical Association, will resolve in favor of Congressman Miller's bill which would place all Federal medical activities in the hands of the United States Public Health Service.

IV. Let us hold fast to the unity of action which found superb expression during the campaign of recent weeks, and let us cherish our gratitude for the magnificent work of the Women's Auxiliary in this crisis, and also for that of our friends who helped us without stint.

That your actions taken at this session may redound to the greatest good of our beloved association and of the people of Montana is the single desire of your servant and comrade,

J. P. RITCHEY, MD., *President.*"

It was regularly moved, duly seconded, and unanimously carried that the reading of the 1943 minutes be dispensed with since they had been published in the official journal of the association.

The secretary read his report to the House of Delegates which is incorporated with and constitutes a part of these minutes.

SECRETARY'S REPORT TO THE HOUSE
OF DELEGATES

Before giving his report, Dr. T. F. Walker, secretary-treasurer, stated that owing to the press of war activities in addition to his own work it would be impossible for him to be a candidate for re-election for the office of secretary-treasurer.

Each year it becomes increasingly apparent that our association is not so organized as to deal effectively with the problems that arise. There is a tendency to shift the burden to fewer and fewer shoulders—usually those of your officers. At each meeting of the House of Delegates fewer committees report fewer meetings, and less work accomplished. That your officers are overburdened is witnessed by the fact that in only one of the past four years has it been possible for all of your officers to visit all of the societies—each year one or more of your officers failing to complete the trip around the state because of ill health.

During the past year the difficulties of conducting the affairs of the association have been greatly increased by the fact that all of us have been so busy taking care of the sick that we have had little time to give to the affairs of our association.

During the past year it has been difficult to secure a meeting of either the executive or economic committees at which all members have been present. For your secretary to carry out the duties entrusted to him requires an absence from his office of from four to six weeks each year. Likewise, the salary paid him is insufficient to meet the clerical expenses of his office.

To overcome some of the weaknesses of our association I would suggest (1) that the officers be relieved of the duty of their annual visits to the various societies for the duration, (2) that a full-time lay secretary be appointed, or, if this is not possible, that the secretary be provided with a full-time clerk who can relieve him of much of his routine duties, and by whose aid he can get out a monthly bulletin or letter to the officers and members of the societies, keeping them informed of the affairs and problems of the association, (3) that in addition to the annual meeting of the House of Delegates there be held each year during the winter months a meeting of the secretaries of the various societies, (4) that committee appointments be made solely on the basis of interest in the affairs of the association, and willingness to work, rather than on the basis of geographic location or political expediency, (5) that the younger men be given every opportunity to serve and work out for themselves the problems of the future which belong to them rather than to us, (6) that every society be familiar with the problems to be dealt with at the annual session and make known to its delegate its view upon these matters.

Experience has shown that those societies function best where the secretary is chosen because of interest and ability and continued in office for a term of years. It is quite apparent that in most societies too little attention is paid to the selection of delegates and too often the delegate fails to report back to his society on the proceedings of the House of Delegates. Perhaps it might be well for each society to pay a part of the expenses of its delegate.

THOS. F. WALKER, M.D., *Secretary-Treasurer.*

It was regularly moved, duly seconded, and unanimously carried that the report be adopted.

Vice President Dr. M. G. Danskin appointed the following doctors to serve on the resolutions committee: Drs. M. A. Shillington, R. D. Knapp, and W. C. Long. To serve on the necrology committee he appointed Drs. H. Gregg, J. Wernham, and G. A. Lewis. Dr. J. H. Irwin, delegate to the A.M.A., gave his report, which, upon motion regularly made, duly seconded, and unanimously carried was adopted.

On the recommendation of the economics committee (see report of economics committee) Mr. Barclay Craighead of the State Unemployment Commission addressed the House of Delegates. He explained that the commission was considering the proposal to make cash payments to insured workers who were unable to work because of illness under the same provision of the Social Security Act as apply to unemployed workers.

In accordance with the recommendations of the economics committee the House, by motion regularly made, duly seconded, and unanimously carried, endorsed the plan presented by Mr. Barclay Craighead.

Mr. L. Fredericks, state director of vocational education, informed the House of Delegates that under law passed by Congress in July 1943, which provided federal funds for the restoration of the vocationally handicapped, the department of vocational rehabilitation contemplated the setting up of the necessary staff to carry out the provisions of the measure. He requested that the medical association appoint a committee to consult with his department as to the methods and details of carrying out the provisions of the above mentioned act. Upon motion regularly made, duly seconded, and unanimously carried the matter was referred to the economics committee.

The vice president, Dr. M. G. Danskin, then called for the reports of committees. Members of the following committees were either absent or stated that their committee had no report to make: orthopedic committee, which is also the advisory committee to the State Board of Health, dentists, pharmacists and nurses committee, medical insurance and legal affairs committee, medical publications committee, postgraduate committee, fracture committee, advisory board of women's auxiliary, industrial hygiene committee, medical military preparedness and defense committee, legislative committee, hospital committee, and public instruction and health committee, which is also the public relations committee.

Dr. J. H. Garberson gave the report of the economics committee. Dr. Caraway moved that the report be accepted. Dr. Shillington seconded the motion which was carried without a dissenting vote.

Vice President Dr. M. G. Danskin then called for the report of the nominating committee which was accepted with no additional nominations being placed from the floor. Vice President Danskin then declared the meeting adjourned until 5:00 at which time the meeting was again called to order by Dr. M. G. Danskin.

House of Delegates reconvened at 5:00 P. M. and:

The secretary, Dr. Thomas F. Walker, submitted the following report from the council:

We, your council, wish to recommend that the bill for \$405.18 submitted by Dr. S. A. Cooney for expenses of his committee be paid. Your council has decided to continue Mr. Toomey as counsel for the association during the calendar year 1945 at a retainer fee of \$300.00. We herewith submit the report of the auditing committee appointed to audit the books of the secretary-treasurer.

AUDITORS' REPORT

This is to certify that this committee has examined the books of the secretary-treasurer of the Montana state medical association and has found them in order, according to the audit report for the period June 23, 1943, to July 7, 1944, inclusive, made by William B. Finlay, certified public accountant. Your committee wishes to call attention to the fact that 78 members have not paid their dues. (Signed):

ALLEN R. FOSS, M.D.
A. D. BREWER, M.D.
H. W. GREGG, M.D.

Upon motion regularly made, duly seconded, and unanimously carried the report of the council was accepted.

Dr. F. I. Terrill gave the report of the tuberculosis committee and moved that the report be adopted and referred to the legislative committee for action. The motion was duly seconded and unanimously carried.

Dr. E. M. Larson introduced the following resolution and moved its adoption. Dr. Shields seconded Dr. Larson's motion which was put by the vice president and adopted without a dissenting vote.

WHEREAS: The Montana medical association is deeply concerned that the death rate of the Montana Indians from tuberculosis is $9\frac{1}{2}$ times as high as among the whites, and there are no existing facilities within the state for their hospitalization,

RESOLVED: That the Montana medical association urges the Congress of the United States to include in the immediate postwar building program an appropriation for the construction of at least a 100-bed addition to the State Tuberculosis Sanatorium at Galen for the use of the Indians.

Be it further resolved, that the Montana legislature be urged to enact appropriate legislation under which the state of Montana may cooperate with the Indian Service in providing addi-

tional beds for the care of tuberculous Indians in the state of Montana.

Dr. J. H. Garberson, chairman of the cancer committee, reported that the Women's Field Army had cooperated with the cancer committee throughout the year and recommended the continued cooperation between the cancer committee and the women's field army. Mrs. Anna Peterson, state commander of the women's field army, gave a brief informal report and offered the services of the women's field army in any undertaking which the medical association should see fit to inaugurate.

Dr. J. C. Shields of the advisory board of the women's auxiliary spoke of the splendid work that the auxiliary had done and recommended that we give every aid and assistance to them in completing their organization.

Dr. J. H. Garberson gave a supplementary report for the economics committee. He reported that the economics committee recommended that the House of Delegates go on record as being willing to cooperate with the bureau of vocational rehabilitation in their program of physical restoration and moved that the president appoint a committee to work with this bureau. The motion was seconded and carried. The president appointed on that committee the following members of the association:

Chairman, Dr. F. F. Attix, Lewistown; Dr. R. B. Durnin, Great Falls; Dr. J. K. Colman, Butte; Dr. F. I. Terrill, Galen; Dr. H. G. Morgan, Red Lodge.

Upon motion regularly made, duly seconded, and unanimously carried the meeting adjourned.

Vice President Dr. M. G. Danskin called the House of Delegates to order Friday morning, July 14, at 8:00 A. M.

Dr. M. A. Shillington submitted the report of the resolutions committee and moved its adoption. The motion was seconded by Dr. H. T. Caraway and was carried without a dissenting vote.

Dr. H. T. Caraway moved that the by-laws be suspended to permit the House of Delegates to act upon an amendment without the necessity of the same lying over for one day. Dr. Caraway's motion was seconded by Dr. M. A. Shillington. The question was put by Vice President Dr. M. G. Danskin and unanimously carried.

Dr. H. T. Caraway then moved that Section 19 of the by-laws be amended by striking out the words "and the two immediate past presidents," inserting the words "and two members to be elected annually by the House of Delegates."

The motion was seconded by Dr. M. A. Shillington and upon being put by the vice president was passed without a dissenting vote. Section 19 will now read as follows:

"Section 19: EXECUTIVE COMMITTEE. There shall be a committee known as the executive committee to consist of the president, president-elect, the secretary, and two members to be elected annually by the House of Delegates. This committee shall be a committee acting as the official representatives of the association except at regular meetings of the House of Delegates. They shall be empowered to act upon all matters of the association which necessitate action before the date of the next annual meeting. Any matter of great concern to the association as a whole shall be decided by the executive committee. All matters which may not be altered by delay shall not be decided by the executive committee, but shall be delayed until the next annual meeting. All standing committees and appointed committees may ask the advice of this committee on matters which they are unable to decide."

Dr. A. D. Brewer moved that the president appoint a committee to consider the advisability of establishing a blood bank on a state-wide basis. The motion was seconded by Dr. M. A. Shillington and carried.

Dr. M. A. Shillington moved that no doctor be permitted to enter into any medical program until the same be approved by the state medical association. The motion was duly seconded and unanimously carried, and the secretary was asked to notify all local societies of this action.

Dr. G. A. Carmichael then gave the report of the maternal and child welfare committee, which, upon motion regularly made and duly seconded, was adopted.

The House proceeded to the election of officers. The first office to be filled was that of president-elect. The candidates that had been nominated for this office were Drs. S. A. Cooney

and M. A. Shillington. Dr. Shillington stated that it would be impossible for him to devote the necessary time to the office, withdrew his name, and moved that Dr. S. A. Cooney be declared president-elect of the Montana state medical association. The motion was seconded by Dr. P. E. Logan and was unanimously carried.

Dr. H. T. Caraway withdrew his name as a candidate for secretary-treasurer and moved that Dr. Ray Peterson of Butte be declared elected secretary-treasurer. The motion was duly seconded and unanimously carried.

Dr. E. M. Gans of Harlowtown withdrew his name as a candidate for the office of delegate to the A.M.A., and moved that Dr. J. H. Irwin be declared delegate to the A.M.A. The motion was duly seconded and unanimously carried.

Dr. F. I. Terrill withdrew his name as a candidate for the position of alternate delegate to the A.M.A. and moved that Dr. B. L. Pampel be elected alternate delegate to the A.M.A. The motion was duly seconded and unanimously carried.

Dr. R. C. Monohan of Butte withdrew his name as councilor for the 9th District, and moved that Dr. H. W. Gregg be declared elected delegate for the 9th District. The motion was duly seconded and unanimously carried.

Dr. J. M. Nelson of Missoula withdrew his name as a candidate for councilor of the 12th District and moved that Dr. A. R. Foss be declared elected councilor for the 12th District. The motion was duly seconded and unanimously carried.

The House of Delegates upon motion regularly made, duly seconded, and unanimously carried accepted the names submitted by the nominating committee as those from which the governor should appoint a member of the board of health to fill the office left vacant by the expiration of Dr. R. V. Morledge's term of office: Dr. R. V. Morledge, Billings; Dr. J. J. Elliott, Lewistown; Dr. M. A. Shillington, Glendive; Dr. A. R. Sievers, Butte; Dr. F. B. Ross, Kalispell.

The ballot was spread for the election of vice president and councilors for District 5 and District 11. The candidates for vice president were Drs. Harry Huggins of Kalispell and T. B. Moore, Jr., of Kalispell. Candidates for District 5 were Drs. F. I. Sabo of Bozeman and R. G. Sherer of Bozeman. Candidates for District 11 were Drs. D. T. Berg and R. W. Morris of Helena. Dr. T. B. Moore received 22 votes for vice president and Dr. Harry Huggins received 8 votes. Dr. F. I. Sabo received 15 votes for councilor in District 5 and Dr. Sherer received 15 votes for councilor in District 5. Dr. D. T. Berg received 19 votes for councilor in District 11 and Dr. R. W. Morris received 11 votes. There being a tie for councilor in District 5 the ballot was again spread. Dr. R. G. Sherer received 13 votes and Dr. F. I. Sabo received 11 votes.

The vice president then declared that the House of Delegates had chosen for the ensuing year the following officers:

President-elect—Dr. S. A. Cooney, Helena.
 Vice president—Dr. T. B. Moore, Jr., Kalispell.
 Secretary-treasurer—Dr. Ray Peterson, Butte.
 Delegate to A.M.A.—Dr. J. H. Irwin, Great Falls.
 Alternate Delegate to A.M.A.—Dr. B. L. Pampel, Warm Springs.
 Councilor District 5—Dr. R. G. Shere, Bozeman.
 Councilor District 11—Dr. D. T. Berg, Helena.
 Councilor District 9—Dr. H. W. Gregg, Butte.
 Councilor District 12—Dr. A. R. Foss, Missoula.

List of candidates for membership of the state board of health as follows:

Dr. R. V. Morledge, Billings.
 Dr. J. J. Elliott, Lewistown.
 Dr. M. A. Shillington, Glendive.
 Dr. A. R. Sievers, Butte.
 Dr. F. B. Ross, Kalispell.

The nominating committee submitted the supplementary report.

Candidates for executive committee: Drs. Thomas F. Walker, M. A. Shillington, L. Brewer and Harry McGregor. The House of Delegates refused to permit the withdrawal of the name of Dr. T. F. Walker and the ballot was spread. Dr. M. A. Shillington received 20 votes. Dr. T. F. Walker received 19 votes. Dr. L. Brewer received 17 votes. Dr. Harry McGregor received 6 votes. The vice president declared Drs. T. F. Walker and M. A. Shillington elected members of the executive committee.

Dr. H. W. Gregg, chairman of the necrology committee, submitted the report of the necrology committee and moved its adoption. The motion was seconded and unanimously carried.

There being no further business to come before the House of Delegates the meeting adjourned.

Medical Economics Committee

Dr. J. C. Shields, Chairman

Report made at opening of Butte meeting, July, 1944.

Your economics committee has held three meetings since the last annual session, one in Billings, one in Helena, and the third in Butte. Various matters vitally affecting the economics of medical practice have been quite thoroughly studied and discussed and as a result this committee hereby submits a report and certain recommendations to the House of Delegates:

I. That Mr. Barclay Craighead be asked to appear before the House of Delegates and explain a plan of sickness insurance as proposed by him. The economics committee recommends the approval of this plan to the House of Delegates.

II. After a most careful consideration of the text of the proposed Osteopathic Practice measure initiated by petition, and of the methods of the campaign conducted, and being currently prosecuted by the osteopaths, the committee is convinced that the proposed measure is a grave menace to the health and well-being of the people of Montana, that its enactment will result in the withdrawal of national recognition of our hospitals and complete disorganization of our nursing service, not to mention its effect on the medical profession which is most injurious. Now, therefore, it is recommended by the economics committee that all possible legitimate action, including a statewide campaign of education, be forthwith undertaken to defeat their measures at the polls; and it is further recommended that the incoming president be empowered to district the state into seven districts and to appoint a representative of the association in each district. Said representatives together with the president as ex-officio member to constitute the committee of this association in full charge of the prosecution of said campaign and the initiation of all proper measures requisite to accomplish the defeat of said Osteopathic Practice Act.

Nominating Committee

Dr. F. F. Attix, Chairman

Your nominating committee respectfully submit the names of the following men for officers of the Montana state medical association:

President-elect—Dr. S. A. Cooney, Helena; Dr. M. A. Shillington, Glendive.

Vice president—Dr. Harry Huggins, Kalispell; Dr. T. B. Moore, Jr., Kalispell.

Secretary-treasurer—Dr. Ray Peterson, Butte; Dr. H. T. Caraway, Billings.

Delegate to A.M.A.—Dr. J. H. Irwin, Great Falls; Dr. E. M. Gans, Harlowtown.

Alternate delegate to A.M.A.—Dr. B. L. Pampel, Warm Springs; Dr. F. I. Terrill, Galen.

Councilors—Dr. F. I. Sabo, Bozeman; Dr. R. G. Scherer, Bozeman; Dr. H. W. Gregg, Butte; Dr. R. C. Monahan, Butte; Dr. D. T. Berg, Helena; Dr. R. W. Morris, Helena; Dr. A. R. Foss, Missoula; Dr. J. M. Nelson, Missoula.

Names available to Governor for appointment to State Board of Health: Dr. J. J. Elliott, Lewistown; Dr. M. A. Shillington, Glendive; Dr. R. E. Seivers, Butte; Dr. F. B. Ross, Kalispell; Dr. R. V. Morledge, Billings. (Signed):

Dr. F. F. ATTIX, Chairman
 Dr. L. G. DUNLAP
 Dr. H. T. CARAWAY

REPORTS OF STANDING COMMITTEES

Tuberculosis Committee

Dr. F. I. Terrill, Chairman

The incidence of tuberculosis discovered on physical examination of selectees and the notable percentage of tuberculosis occurring in our armed forces has brought the tuberculosis problem forcibly to the attention of both the military personnel and to the United States Public Health Service.

At the present time there are two bills before Congress, both appropriation bills, which deal with the prevention and care of tuberculosis. This program is to be carried out under the direction of the Surgeon General. The Federal government has re-

alized the need both of prevention and care and this is the time for the medical society to decide whether it desires this control in the hands of the Federal government or in the state board of health.

If the state has a well organized professional group that is adequately controlling tuberculosis, both in case finding and follow-up, then there could be no excuse for Federal interference. The state and local anti-tuberculosis societies both carried out a sound beginning of case finding, and have laid the necessary ground work for tuberculosis control. Most of this was accomplished through education of the people and these groups are to be commended for their good results. Even though a tuberculosis control unit were established under the state board of health, there would still be a great need for these organizations.

This committee recommends that an appropriation bill be introduced at the next legislative assembly which would establish a tuberculosis control unit under the state board of health. This unit would be composed of a tuberculosis control officer, who would be a qualified physician, with special training in tuberculosis. Under his direction would be the necessary technicians to carry out a case finding program. This bill should include the request for a modern miniature x-ray unit installed in a truck; these units are capable of taking several hundred x-rays a day at a minimum cost of approximately 6 cents per person.

It is estimated that to carry out an adequate program of case finding in the state, between \$50,000 and \$60,000 should be requested. Such programs are being carried out by many other states; notably the states of Washington and Minnesota. Unless some action is taken soon the program will be carried out by the United States Public Health Service. Such a program should logically come under our state board of health, because its organization already has field nurses who are able to do the preliminary survey in the communities and also nurses who could do the important follow-up work of discharged sanitarium patients and their contacts. These nurses are already being utilized to carry out such programs, but further coordination is necessary.

Many states require that all food handlers and teachers have chest x-rays and such requirements by the state board of health would be a positive aid in the control of tuberculosis. Such measures would be enforced by the tuberculosis control officer and his staff.

If we are going to eradicate tuberculosis it will require the cooperation of all of us, especially of you in general practice, because it has been you who have been making the diagnosis of this disease in the past and you who will be doing it in the future. The addition of a tuberculosis control unit to the state board of health will be an aid in helping you make that diagnosis earlier, oftener and a reason for not having this medical problem taken from us by Federal bureaucrats.

Resolutions Committee

Dr. M. A. Shillington, Chairman

Resolution of Appreciation and Thanks to Dr. Ritchey

Whereas, The year 1943-1944 has been one which brought active changes and challenging problems to the practitioner of medicine everywhere, and

Whereas, The Montana state medical society has had its full share of such problems, and

Whereas, Under these circumstances the demand and burden on our medical leaders has been particularly heavy, and

Whereas, Our society, being keenly sensitive to the weight of these burdens of leadership on all our officers and in particular on our president, Dr. John Paul Ritchey, and

Whereas, The society is appreciative of the care, close attention and sincerity with which Dr. Ritchey has met the demands of his office, and

Whereas, on the occasion of the society's annual meeting the attendance of Dr. Ritchey is prevented by his illness.

Now, Therefore, Be It Resolved that our appreciation, thanks, affection, and sincere best wishes be made evident to all by these presents, and be a part of the permanent record of this society and that a copy be sent by our secretary to Dr. Ritchey at his home.

* * * *

Resolution of Thanks to City of Butte

Whereas, The 66th annual scientific session of the Montana

state medical association has been meeting in the city of Butte, Montana, for these two days and the meeting has been a successful one and a pleasant one for the members, because of the careful planning of the local committee and the very fine banquet and entertainment, and because the newspapers have carefully and accurately reported the public interest portions of this meeting,

Therefore, Be It Resolved, That the thanks and appreciation of all the visiting doctors and of the officers of the society be extended to Dr. J. E. Garvey as president of the Silver Bow county medical society and to all his committeemen who assisted him; To Mayor Barry O'Leary of the city of Butte for his part in making our stay pleasant; To Max Dean, manager of the Finlen Hotel, and to his entire staff; and to the editors of the newspapers and their reporters and staffs; and that we express the wish to be invited back for another session at some future date.

* * * *

Resolution of Appreciation of Women's Auxiliary

Whereas, The members of the Montana state medical association have at different times been confronted by certain problems of public relationships and public education and that the members of the ladies' auxiliary have come to the front and have carried very actively and very capably these problems and have given of their time and ability, now, therefore,

Be It Resolved, By the members of the Montana state medical association, that we extend to the women's auxiliary to this association the assurance that we appreciate and recognize the great value of this auxiliary; that we extend our sincere thanks for all that they have already done, and that we pledge ourselves to assist them in every way which we can.

* * * *

Resolution on the Retirement of Dr. Thomas F. Walker as Secretary of the Montana State Medical Association

Whereas, Dr. Thomas F. Walker of Great Falls, Montana, is, at his request, retiring at the conclusion of this 66th annual scientific session of the Montana state medical association, from the office of secretary of the association in which he has served five (5) continuous terms beginning in 1939; and throughout his terms of office Dr. Walker has exemplified the highest standards of manhood and professional attainments by unremitting devotion to duty, by courageous advocacy of principles which he believes right, and by truthful presentation of medical matters to the public of Montana; and Dr. Walker stands at the top of his chosen field of pathology in Montana and enjoys the deep confidence and reliance of the physicians and surgeons of Montana;

Now, Therefore, Be It Resolved, By the Montana state medical association that it now express to Dr. Thomas F. Walker its deep regret at the loss of his services as secretary of the association; its sincere gratitude for duty performed with distinction; its earnest hope for a steady continuance of his valued counsel and advice; and its hearty wishes for vigorous health and happiness in all his activities, all of which are useful to his colleagues and his fellow citizens of Montana.

* * * *

Resolution Relative to the Federal Health Activities

Whereas, the Federal Government has appropriated money from time to time to be spent in one way or another for the care of the sick or the prevention of disease or the rehabilitation of the crippled or in other ways and that this money is expended through five or more different agencies of the central government with or without financial cooperation of local state health agencies and that this health activity being so scattered in different authorities has caused confusion, duplication of effort and loss of efficiency, and

Whereas, there is a bill in Congress known as the Miller Bill which would correct these conditions and place all Federal health activities under the United States Public Health Service, now, therefore,

Be It Resolved, That this society go on record as approving the principles of the Miller Bill and that the secretary be instructed to notify our senators and representatives accordingly.

* * * *

Recommendation to District Medical Societies

In view of the fact that those local county medical societies which have active and competent secretaries are the most successful component parts of our state association,

Resolved, That this House of Delegates go on record as recommending to its component local societies the obtaining of and retention of, for at least several years, an active and competent secretary.

Necrology Committee

Dr. H. W. Gregg, Chairman

Since our last meeting six of our members have died. Dr. Lloyd Sussex of Havre died from coronary disease soon after he had gotten back to the States after three gruelling years in the Pacific—in fact, he had been in the Tarawa show just before coming home. Dr. Sussex was born in 1899 and graduated from the University of Illinois in 1926. He had served as a councilor from his district and had been active in all the activities of the association.

Dr. McCormick C. Smetters of Butte, who had been very active in the Silver Bow county medical society, also passed away. Dr. Smetters was born in 1877, graduated from Illinois in 1900, and had spent most of his active professional life in Butte.

Dr. J. A. Lamb of Kalispell was born in 1874 and had graduated from Quebec in 1898. He had practiced many years in Kalispell.

Dr. J. J. Flynn of Missoula was born in 1881 and graduated from Nebraska in 1906.

Dr. D. R. Bennett of Livingston.

Dr. A. W. Deal of Lewistown, who was for many years a member of the state board of medical examiners, was born in 1882 and graduated from Maryland in 1903.

Therefore, Be It Resolved, That we pause at this time to remember these men, to remember their lives with us, and to be thankful for their friendship and for what they meant to the profession of Montana. That we remember also the families of these men in their hours of sorrow, and that a copy of these resolutions be sent to each family.

Dr. H. W. GREGG, Chairman

Dr. J. I. WERNHAM

Dr. G. A. LEWIS

Maternal and Child Welfare Committee

Dr. Glenn A. Carmichael, Chairman

In 1943 there were twenty maternal deaths in Montana and 11,258 live births. This results in a provisional maternal death rate of 18.7 per 10,000 live births. In 1941 Montana, with a rate of 18.2, was lower than any other state. In 1942 the rate was 22.2 and twenty-three states had lower rates. The U. S. rates for 1943 are not yet available. In the last thirteen years, Montana's maternal deaths have decreased from almost 70 deaths per 10,000 live births to the present rate of 18.7.

The maternal deaths in Montana during 1943 are readily classified according to three major causes: (1) hemorrhage, trauma and shock; (2) toxemia; (3) infection.

Deaths from hemorrhage, trauma and shock. These deaths include deaths due directly to hemorrhage, trauma or shock, during pregnancy, labor, delivery, or the puerperium. There were three deaths from placenta previa; two deaths from postpartum hemorrhage; and two deaths resulting from ectopic gestation.

Deaths from toxemia. These deaths include deaths due directly to convulsive or non-convulsive toxemias of pregnancy and the puerperium. There were five deaths from eclampsia; one from puerperal toxemia; and one from vomiting of pregnancy.

Deaths from infection. These deaths include deaths due directly to infection with mention of abortion, ectopic gestation, or childbirth. There were three deaths from abortion; two from pulmonary embolism; and one from puerperal sepsis.

Fetal salvage. The following table shows the results of the conception in these twenty maternal deaths:

Live births	7
Death before delivery	4
Abortions	4
Still births	3
Ectopics	2

Deaths associated with pregnancy. In addition to the twenty maternal deaths there were three deaths associated with pregnancy. After review of the questionnaire and death certificates these deaths were deleted from the group of maternal deaths because it was thought that the pregnancy was not the direct cause of death. These associated deaths are: Pulmonary tuberculosis 1; accidental burns 1; intestinal obstruction 1.

Comments. A survey of the maternal deaths for Montana during 1943 indicates that essentially the same causes are responsible as in the past. There were seven deaths from hemorrhage, trauma and shock; seven deaths from toxemia; and six deaths from infection. In order to lower the maternal death rate these problems must be attacked.

During the antepartum period patients must be thoroughly instructed concerning the dangers of hemorrhage, infection and toxemia and must be told methods of hygiene and care that will help to prevent these complications. As an illustration, in the 1943 deaths there was one patient who had had vaginal bleeding for three weeks prior to entering the hospital. Possibly this patient had not been made to realize the seriousness of this symptom, especially during the last trimester of pregnancy. Patients must be given specific instructions during the antepartum period, regarding diet, medications, weight gain and rest, with a view toward preventing toxemia. Antepartum instructions should emphasize the importance of reporting the early symptoms of toxemia to the physician so that immediate steps may be taken to prevent the development of eclampsia. Patients who fail to improve at home on diet and rest should be hospitalized immediately for more intensive therapy. Deaths from infection can be reduced by eliminating as far as possible existing sources of infection in the body and by instruction in personal hygiene and habits. Two of our maternal deaths in 1943 were due to illegal abortions. When the opportunity presents, the physician must do all in his power to explain to women the dangers of such a procedure.

Among the 1943 maternal deaths there were many patients who died at the time of delivery or shortly thereafter. When a complication develops at this time, consultation with another physician is very desirable. Usually the more conservative method of delivery results in the lowest maternal and fetal morbidity and mortality. Patients must not be operated on or delivered while in shock. Plasma and whole blood should be used at the first evidence of hemorrhage or impending shock. In all hospital plasma should be kept immediately available.

For the past three years Montana's maternal mortality record has been extremely good, but continued vigilance and care are necessary for its maintenance.

INFANT MORTALITY RATE—1943

The infant mortality rate in 1943 was 39 per 1,000 live births as compared with a rate of 34 in 1942. There were eleven states with lower infant mortality rates in 1942. The basic problem remains one of neonatal deaths, especially of premature infants. Two-thirds of infant deaths in 1943 were under one month of age, and approximately one-third of these were premature. Two hundred seven stillbirths were reported. Specialized services for care of premature infants have been developed in Great Falls. The infant death rate in Cascade county was reduced from 46 per 1,000 livebirths in 1942 to 33 in 1943. The infant death rate in Montana will not be materially reduced until more attention is given to the care of premature and immature infants during the newborn period and until technic and facilities of care are improved. The premature services available through the state board of health have not been utilized to the fullest extent but this service has demonstrated that the lives of more of these infants can be saved. In too many instances it is assumed that these babies will not live and physicians have not given sufficient attention to the newer knowledge of premature care. Plans are underway for postgraduate sessions in pediatrics to consider these problems.

POSTGRADUATE EDUCATION

At the suggestion of the maternal and child health committee it was decided to continue refresher courses in obstetrics and pediatrics. It was felt that because the doctors were busier than ever before, very few of them would be able to attend medical meetings and postgraduate courses out of the state.

Accordingly a refresher course in obstetrics was held in the spring of 1944. The course was conducted by Dr. John Parks, chief of the department of obstetrics and gynecology at Gallinger Municipal Hospital, Washington, D. C. This course was conducted in a manner similar to those of the past. Two meetings were held at four centers: Butte, Great Falls, Billings, and Glendive, and one meeting in Helena. An afternoon meeting followed by dinner and an evening meeting comprised each course. Meetings were very well attended and the physicians' comments indicated that the lectures were satisfactory.

Many physicians from out of the state came in to the Montana meetings. These included men from Cody, Wyoming; Powell, Wyoming; Williston, North Dakota; Dickinson, North Dakota; and Richardson, North Dakota. There was a total attendance at all of the lectures of 142 doctors, with 35 at Butte, 45 at Great Falls, 35 at Billings, 13 at Glendive; and 14 at Helena. In addition, some of the meetings were attended by nurses especially interested in obstetrics.

MATERNITY HOSPITAL LICENSING

During 1943, the work of inspection of maternity hospitals in the state has been continued. This work has been carried out by the assistant director of maternal and child health division and the nursing consultant of the division. In addition to medical and nursing inspection, almost all of the hospitals have received a fire inspection and a report of fire hazards existing in the hospitals has been registered. The hospitals have been notified of the hazards and told to correct them. At the 1943 legislature a law was passed requiring the doors of all public buildings to open outward. Many of the hospitals have already complied with this law.

Since the advent of the maternity hospital licensing law, over eight small hospitals or maternity homes have closed. Repeated inspections of hospitals reveal that a great many of the recommendations made have been carried out. It is believed that the hospitals, for the most part, have cooperated extremely well in the attempt to raise general standards. Yet in some hospitals consultation is not required by hospital rule before major obstetrical procedures are instituted.

NEED FOR PLASMA

Indubitably there is need for more extensive use of blood plasma in prevention of shock and treatment of hemorrhage. In view of the difficulties in many areas of the state in obtaining and maintaining an adequate supply of plasma, as well as expense involved, your committee wishes, with your approval, to consider the possibility of the development of a central blood bank under the direction of the hygienic laboratory of the state board of health. It is possible through the cooperation of the American Red Cross, to operate a mobile unit for the collection of blood from donors and redistribute plasma to the local area on a basis of blood collected from that area. This plan is being successfully operated on a state-wide basis in Michigan. It would necessitate an additional appropriation for increasing facilities of the hygienic laboratory to enable it to render this service.

Your committee recommends that it make further study of this project and present findings and plans to your executive committee with a view to endorsement of a project by the Montana state medical association when request for necessary appropriations is made by the state board of health.

PREMARITAL AND PRENATAL EXAMINATIONS

Your committee calls attention to the fact that thirty-three states require premarital examinations and thirty states require examinations of blood for syphilis for prenatal cases. Montana and Washington are the only two states in the northwestern area that have not passed such laws. These laws have done much toward furthering education in regard to venereal disease as well as detecting actually infected individuals and having them placed under adequate treatment, thus preventing the spread of infection and practically eliminating congenital syphilis.

In Montana selective service examinations revealed that 15 per 1,000 males examined showed a positive reaction to syphilis. There are no figures to indicate incidence among women. While there has been a notable increase in Wassermann examinations of pregnant women in the past few years there are many physicians who do not routinely do Wassermann tests on prenatal cases.

In 1933 the Montana state legislature passed a bill requiring premarital examinations. Subsequently that law was repealed (in 1935) at the instigation of the Montana state medical association because of unsound principles incorporated in that law. Since, through experience in other states, the American Social Hygiene Association has formulated a model law which protects both physicians and patients. Your committee recommends that the Montana state medical association sponsor this bill in the 1944 legislative session. The Montana federation of women's clubs, the Montana business and professional women's club and the Montana public health association have recently recommend-

ed that such legislation be enacted. It is the belief of your committee that the Montana state medical association should be the sponsor for this type of legislation.

E.M.I.C. PROGRAM

Since the inauguration of the Federal Emergency Maternity and Infant Care program in March 1943, Congress has appropriated \$68,800,000 for the program. Of this amount \$42,800,000 was appropriated for the fiscal year ending June 30, 1945. Every state is now participating in the program. The program has been in operation in Montana since May 1943.

In Montana over 2,000 maternity cases and infant cases have been accepted for care with obligations for payment to the amount of slightly over \$200,000 to physicians and hospitals. Approximately \$100,000 of this amount is for payment to physicians in Montana for medical care. There have been no funds allowed for the administration of the program. It has been necessary for the MCH division to absorb these costs and add this program to their already established activities and duties. One hundred ninety-two physicians have participated. One physician has filed application for 183 cases, and one for 106, three for over 50 cases, twelve for 25 to 50, and fifty-one for 10 to 25, with 124 having less than 10 applications on file.

This program was accepted as a wartime program by the Montana physicians with approval of your committee's report to the House of Delegates in 1943. Official recognition has been given by the Surgeon General of the U. S. Army and Navy to physicians and hospitals for their contributions in the total war effort through participation in the program. The Montana physicians as a whole have cooperated even though the implications of a medical care program financed through use of Federal funds and under administration of a Federal agency have been recognized.

Your committee has worked closely in an advisory capacity with the MCH division of the state board of health. The committee has been requested to discuss policies and problems involved in the administration of the program and to make recommendations regarding same. The general policies are outlined by the U. S. Children's Bureau which administers the funds but through the efforts of the MCH division and in accordance with recommendations of your committee, many modifications have been made in the state plan and accepted by the Children's Bureau. These modifications included a fee schedule higher than that originally proposed, inclusion of plan for well child supervision and immunizations by the private practitioner since only a few areas in Montana offer these facilities through public health agencies, modifications which were felt to be essential to meet conditions in this state and at the same time provide highest possible standards of care for protection of patients as well as in the interest of the practicing physicians of the state.

This program was entirely new to all concerned. Some changes in policy were found to be necessary as experience was gained in administering the program, some because of changes in the law, some because of regulations of the Children's Bureau which resulted from nationwide experience. These changes caused some confusion and misunderstanding and it is the intention of the MCH division to issue a brief summary of procedures and regulations for the new fiscal year.

The MCH division has referred problems and complaints to your committee for consideration and guidance. The program is administered throughout the country on a *case basis* rather than on a fee for service basis. The provision is beyond the jurisdiction of the state board of health and no exceptions may be made. While this ruling has resulted in a comparatively low fee for the exceptional or unusually difficult case, the obstetric fee paid under the plan is higher than the average fee in the state and there is reason to believe, considering the economic level of the average enlisted man's wife with a \$50.00 a month allotment, that only a small proportion of the \$100,000 authorized for medical care would have been collected. Furthermore, collection charges would have reduced compensation for services. Under the program the physician is guaranteed full payment as authorized for every case. Unquestionably this program has saved some lives, especially of infants. It has guaranteed protection to the patient by providing adequate hospitalization as needed and has made it possible for the practitioner to render the best type of service without the economic limitations of the patient governing the care which could be obtained.

The state agency has a responsibility in administering public funds derived from taxation. In any extensive programs of this type the state agency is not justified in adding materially to the cost of a case for what might be termed luxury service or experimental therapeutics.

Some physicians have failed to advise patients of benefits available and later have requested authorization on a retroactive basis. This results in unnecessary administrative difficulties, misunderstandings, provision for refund of payments and general dissatisfaction to all concerned. Since adequate provision is made for emergency authorizations, the state board of health cannot continue to approve retroactive requests except under most extenuating circumstances.

In a few instances, especially in the case of sick infants, hospitalization has been prolonged far beyond authorization and neither medical nor hospital records indicate necessity for prolonged hospital care. Custodial care does not come within the province of this program. The funds are allocated each month according to obligations as shown by authorizations and on encumbrance control basis, therefore, requests must be made for additional authorizations.

These, however, are the exceptions. They are reported to you only to point out some of the underlying reasons for protests either on the part of physicians or by those administering the plan. The physicians of Montana have cooperated wholeheartedly. The records submitted serve as a valuable contribution for interpretations of maternal care problems in this state and study of these problems will be one of the projects of your committee.

The hospitals have cooperated fully. Payment to hospitals is made on a cost per diem basis as shown by cost accounting statements submitted. The majority of the hospitals have indicated that this basis of payment is most equitable and the study of costs on this basis is having some far-reaching effects.

The MCH division, through your committee, wishes to express sincere appreciation of your cooperation in this program. Your committee feels that this program is a very real contribution to the total war effort and further feels that this contribution is recognized by the public and deeply appreciated by the men in the armed forces and their wives whom you serve. Your committee recognized many of the problems encountered by you and by the state agency. It stands ready to serve as a liaison in order to both advise regarding policies and interpret accepted policies. You may be assured it has been the intention and is the desire of the state board of health in administering the program to give full consideration to those in private practice in accord with the highest standards of our profession.

Medical Economics Committee Dr. J. C. Shields, Chairman

REPORT ON ASSOCIATION FINANCES

Your committee on economic affairs reports that it has made a careful survey of the financial condition of the association and advises that the absence of members in the armed forces in every theater of war and the consequent decrease in dues, the necessity in their absence of hiring others to carry on the work of the association in the field of public health and other activities which would ordinarily be carried on voluntarily by such members, the duty and necessity of assisting and aiding the 135 members of the association now in the armed forces to become an integral part of regular practice when the war is terminated, and the uncertainty as to future earnings under existing conditions make it imperative to secure additional funds for the work of the association. And your committee further feels that such funds should be raised on a voluntary basis by contribution from the members.

Now, therefore, your committee recommends that the president of the association be, and is authorized to take such measures, and employ such means as may be required to raise such funds by voluntary contributions for carrying on all the activities of the association in the future as long as existing conditions or conditions born of war upheaval and impairment of public health services persist.

MINUTES OF THE SIXTY-SIXTH SCIENTIFIC SESSION, MONTANA STATE MEDICAL ASSOCIATION

The meeting was called to order at 10:30 A. M., Thursday, July 13, in the Finlen Hotel, Butte, Montana, by Vice President Dr. M. G. Danskin, who read the following message from the president, Dr. J. P. Ritchey, who was unable to be present on account of ill health.

"Mr. Chairman, Members of the Montana State Medical Association, and Guests:

I am happy to be given this opportunity to greet you. I thank you for your loyal support, and I congratulate you on your carrying the heavy burden of professional work that you have carried in the absence of our honored colleagues in the armed forces. We are fortunate indeed in being able to look to the incoming administration of Dr. Shields, for so long a devoted and effective worker for our association, and I join with you all in welcoming him to the presidency.

We have grown up and lived our lives, professionally speaking, under the protecting shadow of organized medicine. As we think of the automobile chiefly as a convenient means of going quickly whither we would go, so we might come to take the American Medical Association and its constituent associations for granted. But may not even a nation lose its liberties and its democracy by taking them for granted? Just so, may not medical organizations be as strong as we make them, or as weak as we allow them to become?

Let us not then go our separate ways, but let us make the American Medical Association and our state association the magnificent embodiment of all that the healing art has to offer our people, and let us make them the living expression of our strength, our good-will and our unity,—the unity that flowered so perfectly during the two weeks ending July 6.

My wish for this meeting is that it be the most friendly ever, and that the scientific session be as successful as ever. And I am gratefully aware that our House of Delegates, in its deliberations, will act, out of their wisdom and experience, as those act who know that they hold the future precariously in their hands.

Dr. J. P. RITCHEY, *President*"

Mayor Barry O'Leary of Butte gave the address of welcome following which Dr. J. C. Shields was installed as president of the association and gave his presidential address.

The first paper was given by Dr. Chester W. Lawson of Glasgow, Montana. The title of his paper was "Medical Observations in South China, with Some Notes on the Health Situation in the Japanese Internment Camp." Following Dr. Lawson's paper the meeting was adjourned until 1:30 P. M. when the film "Experiment in the Revival of Organisms" was shown. Dr. J. K. Colman was unable to appear on the program because of ill health. Dr. Henry Michaelson gave a paper on "Diagnosis of Common Skin Diseases." The last paper of the day was given by Dr. John M. Waugh of Rochester, Minnesota, on "Traumatic Injuries of the Abdomen." The meeting was adjourned until 10:30 A. M. Friday, July 14.

The meeting was again called to order at 10:30 A. M. July 14 in the Finlen Hotel in Butte. The first paper of the morning was on "Erythroblastosis" by Dr. Elna M. Howard. This paper was followed by "Dermatological Therapeutics" by Dr. Henry Michaelson of Minneapolis. The meeting adjourned until 1:00 when the film "Experiments in the Revival of Organisms" was again shown. At 1:30 P. M. Dr. J. H. Bridenbaugh of Billings, Montana, gave a paper on "The Use of Radiation Therapy in Some Benign Conditions." Dr. C. L. Bourdeau of Missoula, Montana, gave a paper on "Surgical Indication in Gastric Lesions." The title of Dr. Earl L. Hall's paper was "The Management of Functional Ovarian Cysts." The scientific program was closed by Dr. O. M. Moore of Helena who gave a paper on "Roseola Infantum and Erythema Infectiosum."

Following Dr. Moore's paper President Dr. J. C. Shields of Butte and Dr. E. M. Larson, chairman of a committee of seven, briefly addressed the assemblies.

Dr. H. W. Gregg of Butte gave the report of the necrology committee which upon motion regularly made and duly seconded was unanimously adopted.

Dr. J. J. Elliott of Lewistown extended an invitation of the Fergus county medical society to the Montana state medical association to hold its next annual session in Lewistown, Montana. This invitation will be duly considered by the executive committee.

There being no further business to come before the association Dr. M. G. Danskin declared the 66th annual session adjourned.

REPORT OF DELEGATE TO A.M.A. CONVENTION June 12-16, 1944

The session of the American Medical Association recently held in Chicago was an outstanding success in spite of war conditions which cut the attendance by several thousand; however, a total of 7384 registered. A full house was reported at practically all of the scientific sessions. As in the past, I wish again to call your attention to the scientific exhibits which in themselves are worth the monetary and time cost of attending a meeting of the A.M.A.

The House of Delegates was called to order at 10:15 A.M. Monday, June 12. The preliminaries of opening the session are completed, the first order of business is voting on who is to receive the distinguished service award. The names of three men are selected by the board of trustees from all that have been submitted, after carefully reviewing and considering the merits of those suggested. A vote by the House of Delegates is taken and, if no one of the three receives a majority, the one receiving the least votes is dropped and another ballot is taken. Two ballots were necessary this year. The Board of Trustees proposed the following names: Dr. Isaac Abt of Chicago, Dr. George Dock of Pasadena, California, Dr. Simon Flexnor of New York. On the second ballot Dr. George Dock of Pasadena was elected to receive the distinguished service award.

The House then heard the addresses by the speaker of the house, by the president, and the president-elect. These addresses are all printed in full in the June 24 issue of the *J.A.M.A.* and are well worth the careful consideration of all of you. See pages 563 to 568 of the *J.A.M.A.*

The extensive report of the board of trustees covering their work for the past year was then submitted and the action of the house on the same is printed in full in the July 1 issue of the *J.A.M.A.*

I wish particularly to call to your attention the reports on industrial health, pages 569 and 570, and the report of the committee to study the relationship of medicine and law, pages 577 to 582.

The reports of the reference committee on resolutions submitted by delegates are printed in full in the July 1 *J.A.M.A.* A considerable amount of discussion on war participation, post-war planning, and present maintenance of supply of medical students to insure adequate number of M.D.'s in future years took place.

Resolutions on simplifications and standardizations in insurance forms were introduced. Work on this had already been started by the board of trustees. Meeting held with officers of insurance companies and standardized forms to a certain extent have been worked out which will greatly simplify the reports one makes to insurance companies.

The negro application for further recognition by the A.M.A. was disposed of as usual by the declaration: "The decision as to membership in the component county society or hospital staffs is outside the jurisdiction of the A.M.A. and is a matter of local concern" which simply means that if a colored M.D. is a member of a county society he may become a fellow member of the A.M.A.

The California resolutions on the secretary of A.M.A. and editor of the *J.A.M.A.* are printed on page 649 of the *J.A.M.A.* and the report of the committee which was adopted is on page 650.

A resolution on creation of a department of public health was again approved.

The council on medical service and public relations made an exhaustive report on its activities during the past year. Reports on their activities have been published from time to time in the *J.A.M.A.* In February of this year, a Washington office was

established, something a great many of the delegates have for a long time thought advisable.

In connection with pre-paid medical care plans, the ten principles adopted in 1934 are re-affirmed. A survey was presented of plans being tried out in California, Colorado, Massachusetts, Michigan, New Jersey, New York (western) and several other smaller ones and reports made on their varying success or failures.

There is no objection to pre-paid medical care schemes which conform to the ten principles adopted in 1934. The greatest objection is to compulsory insurance controlled by the Federal government whereby the doctor and the patient are dictated to, and their work largely controlled by politicians. A pre-payment plan for medical care which gives the patient free choice of doctor, allows no interference by a third party, and allows the management of the set-up to be controlled by those interested directly, that is the doctor and the patient, is approved. Counties and cities should work out plans suitable to their localities. Assistance by the bureau of medical economics can be obtained by writing the same in care of the A.M.A.

A great deal of preparatory work is being done to rehabilitate and give postgraduate work to the M.D.'s returning from military service, and all state and county societies are urged to make surveys of conditions and requirements of their respective localities so as to be able to furnish such information when called upon to do so. No doubt our secretary will receive communications about this soon.

Dr. Roger I. Lee of Boston is our president-elect; Dr. Stanley Sieger of Texas, vice president; Dr. Olin West, secretary; Dr. Josiah Moor, treasurer; Dr. H. H. Shoulders, speaker of the house of delegates; Dr. Roy W. Fouts, vice speaker of the house. Dr. Louis H. Bauer of New York who has so ably headed the council on medical service and public relations the past year, was elected to office of trustee. Dr. E. L. Henderson was re-elected. Places on a number of standing committees were filled.

Atlantic City was chosen as the place of meeting for 1947, which will be the 100th anniversary of the A.M.A., and it is hoped that our present strenuous times will have eased sufficiently to allow a suitable celebration of the event. Meeting adjourned.

J. H. IRWIN, M.D.,
Montana Delegate

ADDRESS OF THE PRESIDENT-ELECT J. C. SHIELDS, M.D., Butte

Vice President Danskin, members of the Montana State Medical Association, and Guests:

I sincerely thank each of the members for being elected your president. This is a compliment and an honor, more particularly to the Silver Bow medical society than to me as an individual.

As president-elect, on a visit a few weeks ago to the county medical societies of this state, one could have only pride and admiration for the members. In the great wide spaces I heard a doctor discuss the most recent medical subject with a diction that some sage in a great metropolitan center would envy, although his nearest colleague is fifty to one hundred miles distant. In the country or city everyone that may need medical care and hospitalization receives it, whether he has the means or not. In the face of this, may I ask why the charge was made on the floor of the United States Senate that patients on the streets of Butte were dying for the lack of hospitalization and medical care?

Due to illness, Dr. Ritchey, our president, is unable to be with us. This I deeply regret. Dr. Ritchey has given much time, thought, and effort to the affairs of this association, and he is best qualified to speak on this occasion. Because of the problems that demand immediate action, I shall give a brief outline of suggestions that may serve for discussion and arrangement of our work for the coming year.

This is neither the time nor the place to give a detailed analysis and discussion of Senate Bill 1161. Suffice to say the Wagner-Murray-Dingle Bill is primarily a taxing measure. Should this bill become a law it will completely socialize medical practice, give us *bureaucratic medicine, state medicine, political medicine*. This bill "furnished the instrumentality by which

physicians for their practice, hospitals for their continued existence, and citizens for their health, and that of their families can be made to serve the purposes of a *federal agency*." This bill is a leaf taken from the *Old World bureaucracy*, totalitarianism, and dictatorship.

It seems clear that the American people do not want political medicine; but a considerable portion of the citizens desire some form of pre-payment for medical and hospital care.

Prepaid medical care may be obtained by one of three methods—first, state medicine as Senate Bill 1161, which is mentioned only to be condemned. There is a vast difference between voluntary prepaid medical care and state imposed, mandatory medical care.

The second method is through the insurance companies. Many physicians as well as laymen are of the opinion that it would be a grave mistake to allow insurance companies to control this field. Those who are not in favor of this method believe that whoever controls the finance of the medical practice will control the patient and the physician, and over a given period will dictate the type of medicine furnished.

The third method is that of the local medical societies and state associations furnishing prepaid medicine to localities, counties or states. This method is now in operation in many states, counties and cities. The method is financially sound if properly administered. It is not a panacea for all ills, and the contract that may work in industrial centers would not be suitable for an agricultural district. This I believe to be the best method to combat such legislation as Senate Bill 1161.

Two medical societies in the eastern part of this state have several hundred families under this plan. One of the members of the economics committee will report on the results and the experience with this method, at the House of Delegates.

I would advise the adoption of some one form of prepaid medical care under the jurisdiction of the state medical association. There could be two different types of policies, depending on the section of the state in which this method is operating. The hospitals of the state have prepaid group hospitalization through the Blue Cross plan. Each county medical society should see that all its members carry such a policy with the hospital organization.

In order to have a state-wide plan for prepaid medicine it will be necessary to employ a full-time lay secretary for the state medical association. I believe the time has come in the practice of medicine when it is absolutely necessary to have a full-time lay secretary. If we had been employing a full-time lay secre-

tary this last year we would not have been defeated in the recent campaign of the initiated osteopathic measure. This I urge—the employment of a full-time lay secretary, and the raising of the state dues to meet the expense which would be incurred.

There should be closer cooperation between our state board of health and the state medical association. The state board of health is part and parcel of the state association. I would suggest that the annual meeting of the public health association should be held in the same city and on the day preceding the annual meeting of the state medical association, as has been the custom in the past. I hope that the members of the state board of health will take an active interest throughout the coming year, and participate in arranging a program for the annual meeting in 1945. Such a course will promote both harmony and efficiency.

There are certain phases and arrangements in regard to the Emergency Maternal and Child Welfare program that should be discussed in the house of delegates. The members of the house will be able to arrange the matter in a satisfactory manner, not only to all the members of the state medical association but to the board of health as well.

The state rehabilitation bureau, which is under the state board of education, will now enter the field of medicine and surgery because of recent legislation. I would advise the immediate appointment of a committee of five physicians and surgeons representing the specialties, to advise and cooperate with the state rehabilitation bureau. I wish to call your attention to the Miller Bill which was introduced by Congressman Miller of Nebraska. This bill would place all federal moneys for medical purposes under the jurisdiction of the United States Public Health Bureau. Congressman Miller is a physician and surgeon, and I believe this bill deserves our support.

I take this opportunity not only to congratulate but to praise without stint the magnificent work done by the women's auxiliary, the nurses and the hospitals in the osteopathic campaign which has just ended.

It is your duty and mine to see that a place is retained for service doctors when war has terminated, and they return to the home and the land they love. It is your duty and mine not only to retain a place for them but to assist and aid these colleagues to again become an integral part of civilian practice. Let us pray that when the chapter on the humanitarian history of this war is written our physicians will take their just place with our captains of industry and our field marshals of armies.

MONTANA STATE MEDICAL ASSOCIATION ROSTER--1944

MEMBERSHIP BY DISTRICTS CASCADE COUNTY MEDICAL SOCIETY

Dr. E. D. Hurd, Pres.	Great Falls	Hitchcock, E. D.	Great Falls	McGregor, R. J.	Great Falls
Dr. H. W. Fuller, V. Pres.	Great Falls	Holzberger, R.	Great Falls	★McPhail, Malcolm	Great Falls
Dr. C. F. Little, Sec.-Treas.	Great Falls	Howard, L. L.	Great Falls	McPhail, F. L.	Great Falls
Allred, I. A.	Great Falls	Hurd, F. D.	Great Falls	Mailett, E. L.	Great Falls
Anderson, C. E.	Great Falls	Irwin, J. H.	Great Falls	★Nagel, C. E.	Great Falls
Andrews, F. L.	Great Falls	★Johnson, A. C.	Great Falls	★Peterson, C. H.	Great Falls
Bateman, H. W.	Choteau	Keenan, F. E.	Great Falls	Richardson, R. B.	Great Falls
Blankenhorn, C. E.	Great Falls	Keenan, Thos. M.	Great Falls	Russell, R.	Fort Shaw
Breese, C. J.	Great Falls	Larson, E. M.	Great Falls	Schemm, F. R.	Great Falls
★Craig, F. H.	Great Falls	★Layne, J. A.	Great Falls	Setzer, Geo. W.	Malta
Crary, L. S.	Fairfield	Little, C. F.	Great Falls	Strain, Earle	Great Falls
Davis, R. C.	Great Falls	Logan, P. E.	Great Falls	Templeton, C. F.	Great Falls
Durnin, R. B.	Great Falls	Lord, B. E.	Great Falls	★Vasco, John R.	Great Falls
Fuller, H. W.	Great Falls	MacGregor, J. C.	Great Falls	Walker, Dora	Great Falls
★Gibson, H. V.	Great Falls	★Magner, Chas.	Great Falls	Walker, T. F.	Great Falls
Gleason, A. L.	Great Falls	Mayland, L. L.	Great Falls	★Waniata, F. K.	Great Falls
Greaves, J. P.	Great Falls	McBurney, L. R.	Great Falls	Weisgerber, A. L.	Great Falls
★Hall, C. M.	Great Falls	McGregor, H. J.	Great Falls	Williams, W. T.	Malta
Hall, E. L.	Great Falls	★McGregor, J. F.	Great Falls		

CHOUTEAU COUNTY MEDICAL SOCIETY

Dr. D. J. Cooper, Pres.	Big Sandy	Anderson, E. L.	Ft. Benton	Cooper, D. J.	Big Sandy
Dr. C. F. Bassow, V. Pres.	Ft. Benton	Bassow, C. F.	Ft. Benton	Worstell, Gaylord	Ft. Benton
Dr. E. L. Anderson, Sec.-Treas.	Ft. Benton				

FERGUS COUNTY MEDICAL SOCIETY

Dr. C. W. Wilder, Pres.....	Lewistown	★Eck, Raymond	Lewistown	Herring, J. H.	Lewistown
Dr. J. J. Elliott, V. Pres.....	Lewistown	Elliott, J. J.	Lewistown	Johnson, R. G.	Harlowton
Dr. F. F. Attix, Sec.-Treas.....	Lewistown	Freed, Hazel	Stanford	Porter, E. S.	Lewistown
Alexander, J. L.	Winnett	Gans, E. M.	Harlowton	Soltero, J. R.	Lewistown
Attix, F. F.	Lewistown	★Gans, E. W.	Harlowton	Welden, E. A.	Lewistown
★Dismore, A. B.	Stanford	★Gans, P. J.	Lewistown	Wilder, C. W.	Lewistown

FLATHEAD COUNTY MEDICAL SOCIETY

Dr. Albert Brassett, Pres.....	Kalispell	Clark, C. A.	Eureka	Martin, C. J.	Libby
Dr. E. P. Cockrell, V. Pres.....	Kalispell	Cockrell, E. P.	Kalispell	Moore, T. B., Jr.	Kalispell
Dr. T. B. Moore, Sec.....	Kalispell	Conway, W. Q.	Kalispell	Munro, A. T.	Kalispell
Dr. J. Arthur Lamb, Treas.....	Kalispell	★Delaney, J. R.	Kalispell	Ross, F. B.	Kalispell
★Borkon, M.	Whitefish	Dodge, A. A.	Kalispell	Simons, John B.	Whitefish
Brassett, A. J.	Kalispell	Griffis, L. G.	Kalispell	Stewart, Robt. M.	Whitefish
★Brown, J. W.	Whitefish	★Holcomb, M. D.	Whitefish	Taylor, W. W.	Whitefish
★Burns, M. O.	Kalispell	Huggins, H. D.	Kalispell	Towne, P. L.	Kalispell
Cairns, J. M.	Libby	Lamb, J. A.	Kalispell	★Weed, V. A.	Kalispell
		Lees, A. T.	Whitefish	Wright, G. B.	Kalispell

GALLATIN COUNTY MEDICAL SOCIETY

★Dr. R. A. Williams, Pres.....	Manhattan	★Eneboe, P. L.	Bozeman	Scherer, R. G.	Bozeman
Dr. A. D. Brewer, V. Pres.....	Bozeman	Grigg, E. Roy	Bozeman	Seerley, C. C.	Bozeman
Dr. W. S. Bole, Sec.-Treas.....	Bozeman	Heeterdks, B. J.	Bozeman	Seitz, R. E.	Bozeman
Bole, W. S.	Bozeman	Kearns, E. J.	Bozeman	Sigler, R. R.	Bozeman
Bradbury, J. T.	Willow Creek	Keeton, R. G.	Bozeman	Smith, C. S.	Bozeman
★Craft, C. B.	Bozeman	Phillips, J. H.	Bozeman	Whitehead, C. E.	Bozeman
		Sabo, F. I.	Bozeman	★Williams, R. A.	Manhattan

HILL COUNTY MEDICAL SOCIETY

Dr. Chas. Houtz, Pres.....	Havre	Forester, W. L.	Havre	Lacey, Wm. A.	Havre
Dr. W. F. Hamilton, V. Pres.....	Havre	Hamilton, W. F.	Havre	★MacKenzie, D. S., Jr.	Havre
Dr. Geo. Jestrab, Sec.-Treas.....	Havre	Hoon, A. S.	Chinook	MacKenzie, D. S.	Havre
Benke, R. A.	Chester	Houtz, C. S.	Havre	McCannel, W. A.	Harlem
		Jestrab, G. A.	Havre		

LAKE COUNTY MEDICAL SOCIETY

Dr. G. E. Armour, Pres.....	St. Ignatius	★Brooke, J. M.	Ronan	Mathews, T. A.	St. Ignatius
Dr. J. E. Law, Sec.-Treas.....	Polson	Dimon, J.	Polson	★Tanglin, W. G.	Polson
Armour, G. E.	St. Ignatius	French, E. J.	Ronan	★Teel, H. M.	Polson
		★Lipow, E. G.	Ronan	Venneman, F. W.	St. Ignatius

LEWIS AND CLARK COUNTY MEDICAL SOCIETY

Bayles, R. G.	Townsend	Hershey, Edythe	Helena	★Monserrate, D. N.	Helena
Berg, D. T.	Helena	★Jump, C. F.	Helena	Moore, O. M.	Helena
★Campbell, Robt.	Helena	Kilbourne, B. K.	Helena	Morris, R. W.	Helena
Cashmore, W. F.	Helena	Klein, O. G.	Helena	Morgan, R. M.	Helena
Cooney, S. A.	Helena	Leonard, T. M.	Helena	Nash, F.	Townsend
★Farner, L. M.	Helena	★Lindstrom, E. H.	Helena	★Shearer, B. C.	Helena
Flinn, J. M.	Helena	★McCable, James	Helena	Shale, R. J.	Helena
Gallivan, E. L.	Helena	McElwee, Wm. R.	White Sulphur Springs	Smith, Marjory K.	Helena
★Hawkins, T. L.	Helena		Helena	Thompson, J. G.	Helena
		★Mears, Claude	Helena		

MADISON COUNTY MEDICAL SOCIETY

Dr. L. R. Packard, Pres.....	Whitehall	Burns, W. J.	Sheridan	Dyer, R. H.	Sheridan
Dr. R. H. Dyer, Sec.-Treas.....	Sheridan	Clancy, D. F.	Ennis	Farnsworth, F. B.	Virginia City
		★Clancy, John	Ennis	Packard, L. R.	Whitehall

MOUNT POWELL MEDICAL SOCIETY

Dr. K. A. Tyler, Pres.....	Anaconda	Getty, R. W.	Galen	Noonan, J. H.	Anaconda
Dr. M. R. Snodgrass, V. Pres.....	Anaconda	★Grosboll, A. N.	Philipsburg	O'Rourke, L. J.	Anaconda
	Anaconda	★Harpo, D. T.	Deer Lodge	Pampel, B. L.	Warm Springs
Dr. W. E. Long, Sec.-Treas.....	Anaconda	Holmes, G. V.	Warm Springs	Place, B. A.	Warm Springs
Anderson, G. A.	Deer Lodge	Kargacin, T. J.	Anaconda	Snodgrass, M. R.	Anaconda
Bolton, LeRoy	Deer Lodge	Knight, A. C.	Philipsburg	Terrill, F. I.	Galen
Brewer, A. D.	Galen	Long, W. E.	Anaconda	Tyler, K. A.	Galen
Dunlap, L. B.	Anaconda	★Malee, J. J.	Anaconda	Unmack, F. L.	Deer Lodge

MUSSELSHELL COUNTY MEDICAL SOCIETY

Dr. E. R. Fouts, Pres.....	Ryegate	★Bennett, A. A.	Roundup	Fouts, E. R.	Ryegate
Dr. S. A. Crouse, V. Pres.....	Roundup	Brogan, R. E.	Roundup	Lewis, G. A.	Roundup
Dr. G. A. Lewis, Sec.-Treas.....	Roundup	Crouse, S. A.	Roundup	O'Neill, R. T.	Roundup

NORTHCENTRAL MONTANA MEDICAL SOCIETY

Dr. W. C. Robinson, Pres.....	Shelby	DuBois, W. L.	Conrad	Power, H. W.	Conrad
Dr. H. W. Power, V. Pres.....	Conrad	Elliott, L. L.	Cut Bank	Robinson, W. C.	Shelby
Dr. W. L. Dubois, Sec.-Treas.....	Conrad	Meadows, W. A.	Sunburst	Rogers, R. V.	Browning
Bosshardt, O. A.	Ontario, Calif.	Neraal, P. O.	Cut Bank	Schraeder, H. F.	Browning
★Cannon, P. S.	Conrad	Olsen, N. A.	Cut Bank	★Spatz, J. M.	Cut Bank
		Paterson, W. F.	Conrad	Whetstone, S. D.	Cut Bank

NORTHEASTERN MONTANA MEDICAL SOCIETY

Dr. O. G. Benson, Pres.	Plentywood	Habel, Wm. P. H.	Wolf Point	Morrow, T. M.	Scobey
Dr. H. B. Cloud, V. Pres.	Wolf Point	Knapp, R. D.	Wolf Point	Lawson, Chester W.	Glasgow
Dr. R. E. Ryde, Sec.-Treas.	Glasgow	*Knierim, F. M.	Glasgow	*Peterson, W. M.	Plentywood
Agneberg, N. O.	Glasgow	Krogstad, L. T.	Wolf Point	Pronin, Arthur	Plentywood
Benson, O. G.	Plentywood	Larson, C. B.	Glasgow	Reed, W. H.	Opheim
Cloud, H. B.	Wolf Point	*Mittleman, E. J.	Wolf Point	*Schweizer, H. M.	Ft. Worden, Wash.
Cockrell, T. L.	Hinsdale	Munch, C. J.	Culbertson	Smith, A. N.	Glasgow

PARK-SWEETGRASS MEDICAL SOCIETY

Dr. L. W. Baskett, Pres.	Big Timber	Claiborn, D. R.	Big Timber	Lueck, A. M.	Livingston
Dr. D. R. Bennett, V. Pres.	Livingston	Cogswell, W. F.	Helena	*Paul, F. W.	Big Timber
Dr. Eloise M. Larson, Sec.-Treas.	Livingston	Greene, P. L.	Livingston	*Pearson, J. A.	Livingston
Baskett, L. W.	Big Timber	*Harris, W. E.	Livingston	Townsend, G. A.	Livingston
Bennett, D. R.	Livingston	Larson, Eloise M.	Livingston	*Walker, R. E.	Livingston
		Leard, S. E.	Livingston	Windsor, G. A.	Livingston

SILVER BOW COUNTY MEDICAL SOCIETY

Dr. J. E. Garvey, Pres.	Butte	Hill, R. J.	Whitehall	Poindexter, F. M.	Dillon
Dr. P. T. Spurck, V. Pres.	Butte	Horst, C. H.	Butte	Rodes, C. B.	Butte
Dr. S. V. Wilking, Sec.	Butte	James, H. H.	Butte	*Routledge, C. L.	Dillon
Dr. C. R. Canty, Treas.	Butte	Kane, Joseph J.	Butte	Saam, T. W.	Butte
Atkins, D. A.	Butte	Kane, P. E.	Butte	Schwartz, Harold	Butte
*Bush, T. F.	Butte	*Kane, R. C.	Butte	Shanley, T. J. B.	Butte
Canty, Chas. R.	Butte	Karsted, A.	Butte	Shields, J. C.	Butte
Carmichael, G. A.	Butte	Lapierre, J. C.	Butte	*Sievers, A. R.	Butte
Casebeer, H. L.	Butte	Lhotka, J. F.	Butte	Sievers, J. R. E.	Butte
*Casebeer, R. L.	Butte	MacPherson, G. T.	Butte	Smith, L. W.	Butte
Colman, J. K.	Butte	McGill, Caroline	Butte	Spurck, P. T.	Butte
*Donich, G. M.	Butte	McMahon, E. S.	Butte	Stanchfield, H.	Dillon
Floyd, J. S.	Butte	*Monahan, R. C., Jr.	Butte	*Steinberg, S. S.	Butte
Frisbee, J. B.	Butte	Monahan, R. C.	Butte	Stephan, W. H.	Dillon
Garvey, J. E.	Butte	Mondloch, J. L.	Butte	Thorkelson, Jacob	Butte
Gillispie, D. L.	Butte	O'Keife, N. J.	Butte	Ungtherini, V. O.	Butte
Gregg, H. W.	Butte	*Pemberton, C. W.	Butte	Wilking, S. V.	Butte
*Hale, D. E.	Butte	Ogders, S. L.	Butte	† Williams, Frank	Butte
		Peterson, R. F.	Butte		

SOUTHEASTERN MONTANA MEDICAL SOCIETY

Dr. S. A. Olson, Pres.	Glendive	Garberson, J. H.	Miles City	Parke, Geo. F.	Glendive
Dr. B. C. Farrand, V. Pres.	Jordon	*Harper, R. D.	Sidney	*Pratt, S. C.	Miles City
Dr. J. H. Garberson, Sec.-Treas.	Miles City	Haywood, Guy T.	Forsyth	Randall, R. H.	Miles City
Beagle, J. S.	Sidney	Hogebohm, C. F.	Baker	Rowen, E. H.	Miles City
Benson, R. D.	Sidney	Howard, E. M.	Miles City	Rundle, B. S.	Circle
Blakemore, W. H.	Baker	Huene, H. J.	Forsyth	Sandy, B. B.	Ekalaka
Bridenstine, I. J.	Terry	*Lemon, R. G.	Glendive	Shillington, M. A.	Glendive
Craig, J. W.	Circle	Lindeberg, S. B.	Miles City	Tarbox, B. R.	Forsyth
*Dale, E.	Wibaux	Morrill, R. A.	Sidney	Thompson, J. R.	Miles City
Danskin, M. G.	Glendive	Noonan, E. F.	Wibaux	Varco, A. R.	Miles City
Farrand, B. C.	Jordon	Olson, S. A.	Glendive	Weeks, S. A.	Baker
		Parsons, H. H.	Sidney	Winter, M. D.	Miles City

WESTERN MONTANA MEDICAL SOCIETY

Dr. C. L. Bourdeau, Pres.	Missoula	Frogner, G. S.	Thompson Falls	*Murphy, E. S.	Missoula
Dr. S. N. Preston, V. Pres.	Missoula	*George, E. K.	Missoula	*Murphy, J. E.	Missoula
Dr. H. M. Blegen, Sec.-Treas.	Missoula	*Gordon, D. A.	Hamilton	Nelson, J. M.	Missoula
Alderson, L. R.	Missoula	Haas, A. T.	Missoula	*Noble, P. C.	Polson
Blegen, H. M.	Missoula	Hall, H. J.	Missoula	*Ohlmack, J. P.	Missoula
Bourdeau, C. L.	Missoula	Harris, W. E.	Missoula	Pease, F. D.	Missoula
*Bourdeau, E. J.	Missoula	Hayward, Herbert	Hamilton	Peterson, R. L.	Hamilton
Brewer, L. W.	Missoula	*Hesdorffer, M. B.	Missoula	Preston, S. N.	Missoula
*Bussabarger, R. A.	Missoula	Hiemstra, W.	Missoula	Rennick, P. S.	Stevensville
*Cummings, I. K.	Missoula	Holmes, J. L.	Missoula	Rew, A. W.	Thompson Falls
Doyle, W.	Superior	*Honeycutt, C. F.	Missoula	Richards, J. L.	Polson
*Duffalo, J. A.	Missoula	*Keys, R. W.	Missoula	Ritchey, J. P.	Missoula
Farabaugh, C. L.	Missoula	King, W. N.	Missoula	*Sale, G. G.	Missoula
*Fattic, G. F.	Hot Springs	Koehler, Hiram L.	Missoula	*Stephan, L. B.	Missoula
Fennell, J. W.	Missoula	Winter, A. R.	Missoula	*Svore, G. R.	Somers
*Ferret, A.	Missoula	*Koessler, H. H.	Missoula	Tefft, C. C.	Hamilton
Foss, A. R.	Missoula	Lower, F. H.	Missoula	Thornton, C. R.	Missoula
*Fredrickson, C. H.	Missoula	Marshall, Wm. J.	Missoula	Trenouth, S. M.	Missoula
		*Martin, L. P.	Missoula	*Weber, R. D.	Missoula
		McPhail, W. N.	Missouri	Wirth, R. E.	Missoula
		*Morrison, W. F.	Missoula	Yuhas, Joseph L.	Missoula

YELLOWSTONE VALLEY MEDICAL SOCIETY

Dr. A. L. Hammerel, Pres.	Billings	Adams, E. M.	Red Lodge	Benson, Theo. J.	Fromberg
Dr. Wayne Gordon, V. Pres.	Billings	Allard, L. W.	Billings	*Biehn, R. H.	Billings
Dr. H. T. Caraway, Sec.	Billings	*Anderson, M. O.	Hardin	Blackstone, A. V.	Absarokee
Dr. Albert E. Stripp, Treas.	Billings	Appleman, R. W.	Worden	Bridenbaugh, J. H.	Billings
		Beltzer, Chas. E.	Washoe	*Brunkow, B. H.	Billings

Caraway, H. T.	Billings	Hammernick, Fred	Crow Agency	Movius, A. J., Jr.	Billings
Carey, W. R.	Crow Agency	Hammerel, A. L.	Billings	Movius, A. J., Sr.	Billings
★Chapple, R. R.	Billings	★Hammerell, J. J.	Billings	Nelson, C. H.	Billings
Clark, A. E.	Billings	★Hays, J. D.	Mamouth	Neville, J. V.	Columbus
Culbertson, H. H.	Creston		Hot Springs, Yellowstone Park	Oleinik, J. M.	Red Lodge
★Currie, R. W.	Billings	★Hodges, D. E.	Billings	Powers, J. C.	Billings
★DeCanio, J.	Crow Agency	★Hynes, J. E.	Billings	★Rathman, O. C.	Billings
DeMers, J. J.	Huntley	★Knese, L. A.	Yellowstone County	Richards, W. G.	Billings
Drew, H. O.	Billings	★Kronmiller, L. H.	Billings	★Russell, Leland	Billings
Dunkle, Frank	Billings	Labbitt, L. H.	Hardin	Schubert, J. W.	Hardin
Farr, E. M.	Billings	Leeper, D. D.	Laurel	★Shaw, J. A.	Billings
Ferree, V. D.	Bridger	★Levitt, L.	Worden	★Smith, W. P.	Columbus
★Fisher, M. L.	Hardin	MacDonald, D. J.	Billings	Souders, S. M.	Red Lodge
Gerdes, Maude M.	Billings	★McHeffy, G. J.	Billings	Stripp, A. E.	Billings
Gordon, Wayne	Billings	★MacIntyre, H. E.	Billings	Unsell, David H.	Billings
★Graham, J. H.	Billings	Morgan, H. G.	Red Lodge	Vye, T. R.	Laurel
Griffin, P. E.	Billings	Morledge, R. V.	Billings	Weedman, W. E.	Billings
★Hagmann, E. A.	Billings	★Morrison, J. D.	Billings	Werner, S. L.	Billings
Hall, E. C.	Laurel	Morrison, W. R.	Billings	Wernham, J. I.	Billings

★ Member in the Armed Forces of the United States.
 † Deceased.

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Adams, E. M.	Red Lodge	★Brooke, J. M.	Ronan	Dodge, A. A.	Kalispell
Agneberg, N. O.	Glasgow	★Brown, J. W.	Whitefish	★Donich, G. M.	Butte
Alderson, L. R.	Missoula	★Brunkow, B. H.	Billings	Doyle, W. J.	Superior
Alexander, J. (life member)	Winnett	★Burns, M. O.	Kalispell	Drew, H. O.	Billings
		Burns, W. J.	Sheridan	DuBois, W. L.	Conrad
Allard, L. W.	Billings	Bosshardt, A. O.	606 East J. St., Ontario, Calif.	Dunkle, F.	Billings
Allred, I. A.	Great Falls	★Bush, T. F.	Butte	Dunlap, L. G.	Anaconda
Almas, D. J.	Chinook	★Bussabarger, R. A.	Missoula	Durnin, R. B.	Great Falls
Anderson, C. E.	Great Falls	Cairns, J. M.	Libby	★Duffalo, J. A.	Missoula
Anderson, E. L.	Ft. Benton	★Campbell, Robt.	Helena	Dyer, R. H.	Sheridan
Anderson, G. A.	Deer Lodge	★Cannon, P. S.	Conrad	★Eck, Raymond	Lewistown
★Anderson, M. O.	Hardin	Canty, C. R.	Butte	Elliott, J. J.	Lewistown
Andrews, F. L.	Great Falls	Caraway, H. T.	Billings	Elliott, L. L.	Cut Bank
Armour, G. E.	St. Ignatius	Carmichael, G. A.	Butte	★Eneboe, P. L.	Bozeman
Appleman, R. W.	Worden	Carey, W. R.	Crow Agency	Farabough, C. A.	Missoula
Atkins, D. A.	Butte	Casebeer, H. L.	Butte	★Farner, L. M.	Helena
Attix, F. F.	Lewistown	★Casebeer, R. L.	Butte	Farnsworth, R. B.	Virginia City
★Aubin, F. W.	Havre	Cashmore, W. F.	Helena	Farr, E. M.	Billings
Basket, L. W.	Big Timber	★Chapple, R. R.	Billings	Farrand, B. C.	Jordan
Bassow, C. F.	Ft. Benton	Claiborn, D. R.	Billings	★Fattic, G. R.	Hot Springs
Bayles, R. G.	Townsend	★Clancy, John	Ennis	Fennell, J. W.	Missoula
Bateman, H. W.	Choteau	Clark, A. E.	Billings	Ferree, V. D.	Bridger
Beagle, J. S.	Sidney	Clark, C. A.	Eureka	★Ferrett, A.	Missoula
Beltzer, C. E.	Washoe	Cloud, H. B.	Wolf Point	★Fisher, M. L.	Hardin
Benke, R. A.	Chester	Cockrell, E. P.	Kalispell	Flinn, J. M.	Helena
★Bennett, A. A.	Roundup	Cockrell, T. L.	Hinsdale	Floyd, J. S.	Butte
Bennett, Dan R.	Livingston	Clancy, D. F.	Ennis	Forster, W. L.	Havre
Benson, O. G.	Plentywood	Cogswell, W. F.	Helena	Foss, A. R.	Missoula
Benson, R. D.	Sidney	Colman, J. K.	Butte	Fouts, E. R.	Ryegate
Benson, T. J.	Fromberg	Conway, W. Q.	Kalispell	Freed, Hazel	Stanford
Berg, D. T.	Helena	Cooney, S. A.	Helena	French, E. J. (life member)	Ronan
★Biehn, R. H.	Billings	Cooper, D. J.	Big Sandy	Frisbee, J. B.	Butte
Blackstone, A. J.	Absarokee	★Craft, C. B.	Bozeman	★Fredrickson, C. H.	Missoula
Blakemore, W. H.	Baker	Craig, J. W.	Circle	Frogner, G. S.	Thompson Falls
Blankenhorn, C. E.	Great Falls	★Craig, F. H.	Great Falls	Fuller, H. W.	Great Falls
Blegen, H. M.	Missoula	Crary, L. S.	Fairfield	Gallivan, E. L.	Helena
Bole, W. S.	Bozeman	Crouse, S. A.	Roundup	Garvey, J. E.	Butte
Bolton, L. R.	Deer Lodge	Colbertson, H. H.	Creston	Gans, E. M.	Harlowton
★Borkon, M.	Whitefish	★Cummings, I. K.	Missoula	★Gans, E. W.	Harlowton
Bourdeau, C. L.	Missoula	★Currie, R. W.	Billings	★Gans, P. J.	Lewistown
★Bourdeau, E. J.	Missoula	Darskin, M. G.	Glendive	Garberson, J. H.	Miles City
Bradbury, J. T.	Willow Creek	★Dale, E.	Wibaux	★George, E. K.	Missoula
Brassett, A. J.	Kalispell	Davis, R. C.	Great Falls	Gerdes, Maude M.	Billings
Bresee, C. J.	Great Falls	★DeCanio, J.	Crow Agency	Getty, R. W.	Galen
Brewer, A. D.	Galen	★Delaney, J. R.	Kalispell	★Gibson, H. V.	Great Falls
Bridenbaugh, J. H.	Billings	DeMers, J. J.	Huntley	Gillespie, D. L.	Butte
Brewer, L. W.	Missoula	Dimon, J.	Polson	Gleason, A. L.	Great Falls
Bridenstine, I. J.	Terry	★Dismore, A. B.	Stanford	Gordon, Wayne	Billings
Brogan, R. E.	Roundup			★Gordon, D. A.	Hamilton

★Graham, J. H.	Billings	Kronmiller, L. H.	Billings	★Murphy, E. S.	Missoula
Greaves, J. P.	Great Falls	Keenan, T. M.	Great Falls	★Murphy, J. E.	Flathead County
Greene, P. L.	Livingston	Labbitt, L. H.	Hardin	Moore, O. M.	Helena
Gregg, H. W.	Butte	Lacey, W. A.	Havre	★Nagel, C. E.	Great Falls
Griffin, P. E.	Billings	Lamb, J. A.	Kalispell	Nash, F.	Townsend
Griffis, L. G.	Kalispell	Lapierre, J. C.	Butte	Nelson, C. H.	Billings
Grigg, E. R.	Bozeman	Larson, Eloise M.	Livingston	Nelson, J. M.	Missoula
★Grossboll, A. N.	Philipsburg	Larson, C. B.	Glasgow	Neraal, P. O.	Cut Bank
Haas, A. T.	Missoula	Larson, E. M.	Great Falls	Neville, J. V.	Columbus
★Hagmann, E. A.	Billings	Law, John E.	Polson	★Noble, P. C.	Polson
Habel, W. P.	Poplar	Lawson, C. W.	Glasgow	Noonan, E. F.	Wibaux
★Hall, C. M.	Great Falls	★Layne, J. A.	Great Falls	Noonan, J. H.	Anaconda
Hall, E. L.	Great Falls	Leard, S. E.	Livingston	Odgers, S. L.	Butte
Hall, E. C.	Laurel	Leonard, T. M.	Helena	★Ohlmach, J. P.	Missoula
Hall, H. J.	Missoula	★Levitt, L.	Worden	★O'Keefe, N. J.	Butte
Hamernick, F.	Crow Agency	Leeper, D. D.	Laurel	Olson, N. A.	Cut Bank
Hamilton, W. F.	Havre	Lees, A. T.	Whitefish	Olson, S. A.	Glendive
Hammerel, A. L.	Billings	★Lemon, R. G.	Glendive	O'Neill, R. T.	Roundup
★Hammerell, J. J.	Billings	Lueck, A. M.	Livingston	O'Rourke, J. L.	Anaconda
★Harper, R. D.	Sidney	Lewis, G. A.	Roundup	Oleinek, John M.	Red Lodge
★Hale, D. E.	Butte	Lhotka, J. F.	Butte	Packard, L. R.	Whitehall
★Harpo, D. T.	Deer Lodge	Lindeberg, S. B.	Miles City	Pampel, B. L.	Warm Springs
★Harris, W. E.	Livingston	★Lindstrom, E. H.	Helena	Parsons, H. H.	Sidney
Harris, W. E.	Missoula	★Lipow, E. G.	Ronan	Paterson, W. F.	Conrad
★Hawkins, T. L.	Helena	Little, C. F.	Great Falls	Parke, Geo. F.	Glendive
★Hays, J. D.	Mamouth	Logan, P. E.	Great Falls	★Paul, F. W.	Big Timber
	Hot Springs, Yellowstone Park	Long, W. C.	Anaconda	Pease, F. D.	Missoula
Hayward, H. C.	Hamilton	Lord, B. E.	Great Falls	★Pearson, J. A.	Livingston
Heetderks, B. J.	Bozeman	Liest, L. J.	Ft. Peck	★Pemberton, C. W.	Butte
Herring, J. H.	Lewistown	Lowe, F. H.	Missoula	★Peterson, C. H.	Great Falls
Hershey, Edythe	Helena	MacDonald, D. J.	Billings	Peterson, R. L.	Hamilton
★Hesdorffer, M. B.	Missoula	MacGregor, J. C.	Great Falls	Peterson, R. F.	Butte
Hiemstra, W.	Missoula	★MacIntyre, H. E.	Billings	Peterson, W. M.	Plentywood
Hill, R. J.	Whitehall	★MacKenzie, D. S., Jr.	Havre	Phillips, J. H.	Bozeman
Hitchcock, E. D.	Great Falls	MacKenzie, D. S.	Havre	Place, B. A.	Warm Springs
★Hodges, D. E.	Billings	MacPherson, G. T.	Butte	Poindexter, F. M.	Dillon
★Holcomb, M. D.	Whitefish	★Magner, Chas.	Great Falls	Porter, E. S.	Lewistown
Holmes, G. V.	Warm Springs	Maillet, L. L.	Great Falls	Power, H. W.	Conrad
Holmes, J. T.	Missoula	★Malee, J. J.	Anaconda	Powers, J. C.	Billings
Holzberger, R. J.	Great Falls	Marshall, W. J.	Missoula	★Pratt, S. C.	Miles City
★Honeycutt, C. F.	Missoula	Martin, C. J.	Libby	Preston, S. M.	Missoula
Hoon, A. S.	Chinook	★Martin, L. P.	Missoula	Pronin, Arthur	Plentywood
Horst, C. H.	Butte	Mathews, T. A.	St. Ignatius	Randall, R. R.	Miles City
Houtz, C. S.	Havre	Mayland, L. L.	Great Falls	★Rathman, O. C.	Billings
Howard, E. M.	Miles City	McBurney, L. R.	Great Falls	Reed, Wm. H.	Opheim
Howard, L. L.	Great Falls	★McCabe, J. J.	Helena	Rennick, P. S.	Stevensville
Huene, H. J.	Forsyth	McCannel, W. A.	Harlem	Rew, A. W.	Thompson Falls
Huggins, H. D.	Kalispell	McElwee, Wm. R.	White Sulphur Springs	Richards, J. L.	Polson
Hurd, F. D.	Great Falls	McGill, Caroline	Butte	Richards, W. G.	Billings
★Hynes, J. E.	Billings	McGregor, H. J.	Great Falls	Richardson, R. B.	Great Falls
Hogebohm, C. F.	Baker	★McGregor, J. F.	Great Falls	Ritchey, J. P.	Missoula
Haywood, Guy T.	Forsyth	McGregor, R. J.	Great Falls	Robinson, W. C.	Shelby
Irwin, J. H.	Great Falls	★McHeffy, G. J.	Billings	Rodes, C. B.	Butte
James, H. H.	Butte	McMahon, E. S.	Butte	Ross, F. B.	Kalispell
Jestrab, G. A.	Havre	McPhail, Malcolm	Great Falls	★Routledge, C. L.	Dillon
★Johnson, A. C.	Great Falls	★McPhail, F. L.	Great Falls	Rowen, E. H.	Miles City
Johnson, R. G.	Harlowton	McPhail, W. N.	Missoula	★Russell, L. G.	Billings
★Jump, C. F.	Helena	Meadows, W. A.	Sunburst	Russell, R. (honorary member)	Ft. Shaw
Kane, Joseph J.	Butte	★Mears, Claude	Helena	Ryde, R. E.	Glasgow
Kane, P. E.	Butte	★Mittleman, E. J.	Wolf Point	Rogers, R. V.	Browning
★Kane, R. C.	Butte	★Monahan, R. C., Jr.	Butte	Rundle, B. S.	Circle
Kargacin, T. J.	Anaconda	Mondloch, J. L.	Butte	Samm, T. W.	Butte
Karsted, A. J.	Butte	★Monserrate, D. N.	Helena	Sabo, F. I.	Bozeman
Kearns, E. J.	Bozeman	Moore, T. B., Jr.	Kalispell	★Sale, G. G.	Missoula
Keenan, F. E.	Great Falls	★Morgan, R. N.	Butte	Sandy, B. B.	Eklaka
Keeton, R. G.	Bozeman	Morgan, H. O.	Red Lodge	Schemm, F. R.	Great Falls
★Keys, R. W.	Missoula	Morledge, R. V.	Billings	Scherer, R. G.	Bozeman
Kilbourne, B. K.	Helena	Morrill, R. A.	Sidney	Schraeder, H. F.	Browning
King, W. N.	Missoula	Morris, R. W.	Helena	Schubert, J. W.	Hardin
Kintner, A. R.	Missoula	★Morrison, J. D.	Billings	Schwartz, H.	Butte
Klein, O. G.	Helena	★Morrison, W. F.	Missoula	Schwartz, S. E.	Butte
Knapp, R. D.	Wolf Point	Morrison, W. R.	Billings	★Schweizer, H. M.	Poplar
★Knese, L. A.	Yellowstone Valley	Morrow, Thos. M.	Scobey	Seerley, C. C.	Bozeman
★Knierim, F. H.	Glasgow	Movius, A. J.	Billings	Seitz, R. E.	Bozeman
Knight, A. C.	Philipsburg	Movius, A. J., Jr.	Billings	Setzer, G. W.	Malta
Koehler, Hiram L.	Missoula	Munch, C. J.	Culbertson	Shanley, T. J. B.	Butte
★Koessler, H. H.	Missoula	Munro, A. T.	Kalispell	Shale, R. J.	Helena
Krogstad, L. T.	Wolf Point				

★Shaw, J. A.	Billings	Stripp, A. E.	Billings	Walker, Dora V. H.	Great Falls
★Shearer, B. C.	Helena	★Svove, C. R.	Somers	★Walker, R. E.	Livingston
Shields, J. C.	Butte	Swanson, C. A.	Poplar	Walker, Thos. F.	Great Falls
Shillington, M. A.	Glendive	★Tanglin, W. G.	Polson	★Waniata, F. K.	Great Falls
Sigler, R. R.	Bozeman	Tarbox, B. R.	Forsyth	★Weed, V. A.	Kalispell
★Sievers, A. R.	Butte	Taylor, W. W.	Whitefish	★Weber, R. D.	Missoula
Sievers, J. R. E.	Butte	★Teel, H. M.	Polson	Weeks, S. A.	Baker
Simons, J. B.	Whitefish	★Tefft, C. C.	Hamilton	Weedman, W. F.	Billings
Smith, A. N.	Glasgow	Templeton, C. V.	Great Falls	Weisgerber, A. L.	Great Falls
Smith, C. S.	Bozeman	Terrill, F. I.	Galen	Welden, E. A.	Lewistown
Smith, L. W.	Butte	Thompson, J. C.	Helena	Werner, S. L.	Billings
Smith, Marjory K.	Helena	Thompson, J. R.	Miles City	Wernham, J. I.	Billings
★Smith, W. P.	Columbus	Thorkelson, J.	Butte	Wetstone, S. D.	Cut Bank
Snodgrass, M. R.	Anaconda	Thornton, C. R.	Missoula	Whitehead, C. E.	Bozeman
Souders, S. M.	Red Lodge	Towne, R. L.	Kalispell	Wilder, C. W.	Lewistown
Soltero, J. R.	Lewistown	Townsend, G. A.	Livingston	Wilking, S. V.	Butte
★Spatz, J. M.	Cut Bank	Trenough, S. H.	Missoula	† Williams, Frank	Butte
Spurck, P. T.	Butte	Tyler, K. A.	Galen	★Williams, R. A.	Manhattan
Stanchfield, H.	Dillon	Ungherini, V. O.	Butte	Williams, W. T.	Malta
★Steinberg, S. S.	Butte	Unmack, F. L.	Deer Lodge	Windsor, G. A.	Livingston
Stephan, W. H.	Dillon	Unsell, David H.	Billings	Winter, M. D.	Miles City
★Stephan, L. B.	Missoula	Varco, A. R.	Miles City	Wirth, R. E.	Missoula
Stewart, R. M.	Whitefish	★Vasco, J. R.	Great Falls	Worstell, G.	Big Sandy
Strain, Earle	Great Falls	Vennemann, S. W.	St. Ignatius	Wright, G. B.	Kalispell
		Vye, T. R.	Laurel	Yuhas, Joseph L.	Missoula

★ Member in the Armed Forces of the United States.

† Deceased.

MEMBERS IN ARMED FORCES (BY DISTRICTS)

Cascade County Medical Society		Monserrate, D. N. Helena		Western Montana Medical Society	
Craig, F. H.	Great Falls	Shearer, Beryl C.	Helena	Bourdeau, E. J.	Missoula
Gibson, H. V.	Great Falls	Madison County Medical Society		Bussabarger, R. A.	Missoula
Hall, Cecil M.	Great Falls	Clancy, John Ennis		Cummings, I. K.	Missoula
Johnson, A. C.	Great Falls	Mount Powell Medical Society		Duffalo, J. A.	Missoula
Layne, J. A.	Great Falls	Grossboll, A. N. Philipsburg		Fattic, G. F.	Hot Springs
Magner, Chas.	Great Falls	Harpe, D. T. Deer Lodge		Ferret, A.	Missoula
McGregor, J. F.	Great Falls	Halee, J. J. Anaconda		Fredrickson, C. H.	Missoula
McPhail, F. L.	Great Falls	Musselshell County Medical Society		George, E. K.	Missoula
Nagel, Chas. E.	Great Falls	Bennett, A. A. Roundup		Gordon, Donald A.	Hamilton
Peterson, C. H.	Great Falls	Northcentral Montana Medical Society		Hesdorffer, M. B.	Missoula
Vasco, John R.	Great Falls	Cannon, P. S. Conrad		Honeycutt, C. F.	Missoula
Waniata, F. K.	Great Falls	Spatz, J. M. Cut Bank		Keys, R. W.	Missoula
Fergus County Medical Society		Northeastern Montana Medical Society		Koessler, H. H.	Missoula
Dismore, A. B.	Stanford	Knierim, F. M. Glasgow		Martin, L. P.	Missoula
Eck, Raymond	Lewistown	Mittleman, Edw. J. Wolf Point		Morrison, W. F.	Missoula
Gans, E. W.	Harlowton	Peterson, W. M. Plentywood		Murphy, E. S.	Missoula
Gans, Paul J.	Lewistown	Schweizer, H. W. Ft. Worden, Washington		Murphy, J. E.	Missoula
Flathead County Medical Society		Park-Sweetgrass Medical Society		Noble, P. C.	Polson
Borkow, M.	Whitefish	Harris, W. E. Livingston		Ohlmack, J. P.	Missoula
Brown, J. W.	Whitefish	Paul, F. W. Big Timber		Sale, G. G.	Missoula
Burns, M. O.	Kalispell	Pearson, J. A. Livingston		Stephan, Louis B.	Missoula
Delaney, J. R.	Kalispell	Walker, R. E. Livingston		Svove, C. R.	Somers
Holcomb, M. D.	Whitefish	Silver Bow County Medical Society		Weber, R. D.	Missoula
Weed, V. A.	Kalispell	Bush, T. F. Butte		Yellowstone Valley Medical Society	
Gallatin County Medical Society		Casebeer, R. L. Butte		Anderson, M. O.	Harden
Craft, Chas. B.	Bozeman	Donich, G. M. Butte		Biehn, R. H.	Billings
Eneboe, Paul L.	Bozeman	Hale, D. E. Butte		Brunkow, B. H.	Billings
Williams, R. A.	Bozeman	Kane, R. C. Butte		Chapple, R. R.	Billings
Hill County Medical Society		Kroeze, R. Butte		Currie, Robt. W.	Billings
MacKenzie, D. S., Jr.	Havre	Monahan, R. C. Butte		DeCanio, John	Crow Agency
Lake County Medical Society		Morgan, R. N. Butte		Fisher, M. L.	Hardin
Brooke, J. M.	Ronan	Pemberton, C. W. Butte		Graham, J. H.	Billings
Lipow, E. G.	Ronan	Routledge, Geo. L. Dillon		Hagmann, E. A.	Billings
Tanglin, W. G.	Polson	Sievers, A. R. Butte		Hammerel, J. J.	Billings
Teel, H. M.	Polson	Steinberg, S. S. Butte		Hayes, J. D.	Billings
Lewis & Clark County Medical Society		Southeastern Montana Medical Society		Mamouth Hot Springs	
Campbell, Robt.	Helena	Dale, E. Wibaux		Hodges, D. E.	Billings
Farner, L. M.	Helena	Harper, R. D. Miles City		Hynes, John E.	Billings
Hawkins, Thos. L.	Helena	Lemon, R. G. Forsyth		Knese, L. A.	Yellowstone County
Jump, C. F.	Helena	Pratt, S. C. Miles City		Levitt, Louie	Worden
Lindstrom, E. H.	Helena			McHeffy, Geo. J.	Billings
McCabe, James	Helena			McIntyre, H. E.	Billings
Mears, Claude	Helena			Morrison, J. D.	Billings
				Rathman, Omer C.	Billings
				Russell, Leland	Billings
				Shaw, J. A.	Billings
				Smith, W. P.	Columbus

REPORT OF THE THIRD ANNUAL MEETING OF THE WOMAN'S AUXILIARY TO THE MONTANA STATE MEDICAL ASSOCIATION

The third annual convention of the woman's auxiliary to the Montana state medical association was held at the Finlen Hotel in Butte, Montana, July 13-14, 1944.

Registration opened on Thursday at 9:30 A. M., under the capable leadership of Mrs. J. C. Shields and Mrs. Samuel Schwartz of Butte, who reported that six state officers, two directors, ten committee chairmen, six county presidents, nine delegates, twenty-one non-voting members and twenty-two guests registered.

The convention was formally opened Thursday at 2 o'clock in the Silver Bow room by Mrs. P. E. Logan, state president. Mrs. R. V. Morledge of Billings led the members in the pledge of allegiance to the Flag. Mrs. F. B. Ross of Kalispell, gave the pledge of loyalty to the auxiliary. Mrs. Harold Schwartz, president of the Silver Bow auxiliary, gave the address of welcome, and Mrs. F. B. Ross responded in behalf of the auxiliary.

The "In Memoriam" service was given by Mrs. P. E. Griffin of Billings, for Mrs. J. I. Wernham and Mrs. A. E. Stripp, both of Billings. The members stood one minute in silent tribute to their memory.

Mrs. E. D. Hitchcock, Great Falls, chairman of the special committee to approve the minutes of the annual meeting held in Billings, July 9, 1943, reported after a few slight corrections that the minutes were approved. This report was read by the secretary.

Communications from the following were read by the president: Mrs. David Thomas, national president of the woman's auxiliary, explaining that due to lack of transportation facilities she was unable to attend the convention; Dr. J. P. Ritchey, president of the Montana state medical association, expressing his regrets that due to illness he was unable to be present; Dr. G. V. Holmes, clinical director of the Montana state hospital, extending an invitation to the woman's auxiliary to visit the sanitarium at Warm Springs and acquire first-hand knowledge of state institutions; and Mrs. David T. Berg thanking the state auxiliary for the corsage sent her while attending the national convention in Chicago. The convention moved that a letter be sent to Dr. Ritchey expressing our regrets that he was unable to be with us and wishing him a speedy recovery.

The recording secretary, Mrs. A. L. Gleason, Great Falls, reported one executive and two board of directors meetings held during the year, with a total attendance of twenty-five. These meetings were all held in Helena, a central location for the convenience of the board members throughout the state.

The treasurer, Mrs. A. A. Dodge, Kalispell, reported balance on hand at the beginning of the fiscal year \$101.95. Receipts during the year \$181.25, disbursements \$169.30, leaving a balance July 13, 1944, of \$113.90.

Mrs. P. E. Griffin, chairman of organization, reported seven organized auxiliaries, as follows:

- Cascade County, Great Falls—40 members
- Silver Bow County, Butte—31 members
- Yellowstone Valley, Billings—29 members
- Western Montana, Missoula—28 members
- Southeastern Montana, Miles City—20 members
- Flathead County, Kalispell—18 members.
- Lewis & Clark, Helena—14 members.

with a total membership of 180, making an increase of 96 members over last year. Two of these auxiliaries, the Silver Bow and the Southeastern, were organized during the year. Other counties were contacted but did not feel it advisable to organize at this time.

Mrs. W. N. King, Missoula, chairman of the Bulletin, reported fourteen subscriptions to the Bulletin. She regretted the lack of interest in some of the county auxiliaries in subscribing to the Bulletin, as it is the official publication of the national auxiliary.

Mrs. T. L. Hawkins, Helena, chairman of legislation, reported that all county auxiliaries had responded to the state medical association's request to impart information re the Wagner-Murray-Dingell bill. County auxiliaries also assisted during this present emergency created by the osteopathic petition.

Mrs. Charles J. Bresee, Great Falls, chairman of Hygeia, reported forty-eight subscriptions to Hygeia. Through the kind-

ness of Mr. F. V. Cargill, circulation manager for Hygeia, sample copies of Hygeia were sent to all county chairmen.

Mrs. R. C. Monahan, Butte, chairman of publicity, reported accounts of the fine work done by the county publicity chairmen in their respective auxiliaries. She thanked the press of Montana for their courteous and generous help to all auxiliaries. Mrs. Monahan deserves recognition for her able supervision in handling the publicity for the state convention held in Butte, July 13-14, 1944.

Mrs. E. M. Larson, Great Falls, chairman of program, reported seven social and twenty-five educational meetings held by the county auxiliaries during the year. She suggested that owing to different situations in the various states that the national committee on program allow the state chairmen greater freedom in selection of topics.

Mrs. I. J. Bridenstine, Terry, as historian, reported that she was working on the history from the beginning of the organization, hoping to have material from each county as well as the state, and would have something of interest to report at the next convention.

Mrs. J. H. Irwin, Great Falls, chairman of war service, reported a total of 12,277½ hours was given by members to war service and Red Cross activities. Donations of food were given to the USO canteen, etc., and five dollars (\$5.00) by one of the auxiliaries to the Red Cross drive.

Mrs. R. V. Morledge, Billings, chairman of public relations, reported that a letter was sent to each county public relations chairman with the following suggested programs: (a) Promotion of Health Education, (b) Promotion of Child Health and Child Care, (c) Promotion of Authentic Nutrition Programs, (d) Promotion of Ideals of American Medicine. These headings were reclassified to give a wide choice in planning their work. Posters "Doctors at War" were sent to all auxiliaries to be distributed in public places. Many of the chairmen occupied executive and teaching positions and promoted health work through clubs, etc.

Mrs. Malcolm McPhail, Great Falls, chairman of revision, reported that a substitute constitution and by-laws for the one now in force would be presented at this convention for consideration.

Mrs. Glenn A. Carmichael, Butte, chairman of convention, reported that she was being assisted by the following committees: Mrs. E. S. McMahon, program; Mrs. C. B. Rodes, entertainment; Mrs. J. B. Frisbee, reception; Mrs. P. T. Spurck, registration; Mrs. J. K. Colman, transportation; Mrs. R. C. Monahan, publicity; Mrs. J. C. Shields, credentials.

Mrs. D. L. Gillespie, Butte, official delegate to the National convention from Montana, gave interesting high-lights of the meeting held in Chicago, mentioning especially the addresses given by Dr. Herman L. Kretschmer, president-elect of the American Medical association, Dr. James E. Paullin, president of the American Medical association, Dr. Morris Fishbein, editor, *Journal of the American Medical Association*, and Hygeia, and Vice Admiral Ross T. McIntire, Surgeon General, U. S. Navy, on the subject of "Women and the War."

At the second session of the convention reports of county presidents were read, from which the following extracts have been taken.

Mrs. P. E. Griffin, president of the Yellowstone Valley auxiliary, Billings, reported increased membership with a splendid monthly attendance. Many of their members are occupying volunteer executive positions in Red Cross work. Excellent educational programs were presented during the year by members of the auxiliary, as a result of their study and reading. Dr. M. A. Shillington and Mr. W. J. Jameson also gave talks to the auxiliary. A visit by the state president, Mrs. P. E. Logan, was much enjoyed and acted as a stimulant to the auxiliary. At the request of the Yellowstone Valley medical society, the members were instrumental in securing several hundred withdrawal signatures from the petition circulated by the osteopathic society.

Mrs. E. M. Larson, president of the Cascade county auxiliary, Great Falls, reported forty-three members, three of whom are associate. The programs for the year were instructive and educational, following closely the suggestions of the national

chairman of program. Dr. J. H. Irwin, Dr. L. L. Howard and Captain A. R. Sievers of the army air base, gave fine talks to the auxiliary. One member gave a book review and another member gave a talk on Red Cross activities. Also an address on "Occupational Therapy" was given by a physiotherapist from Washington, D. C. Several members have done outstanding work in nurses aide, surgical dressings, home nursing and volunteer special services. An intensive drive results in twenty-six subscriptions to Hygeia and ten to the Bulletin.

Mrs. T. L. Hawkins, president of the Lewis & Clark auxiliary, Helena, reported that talks were given by local doctors on rheumatic fever, infantile paralysis, food preservation, and meat and milk inspection and protection. A book review was presented by a guest member during the year. Several of the members are active in Red Cross work. Subscriptions of Hygeia were donated to grammar and high schools in the city. Some volunteer service was given to the women's field army of the American society for the control of cancer.

Mrs. J. M. Nelson, president of the Western Montana auxiliary, Missoula, reported they were fortunate in having Dr. J. P. Ritchey, president of the Montana state medical association, a resident of their city. Dr. Ritchey gave a fine presentation of the Wagner-Murray-Dingell bill at one of their meetings. Professors from the University of Montana presented two interesting programs on post war and government. Christmas gifts were sent to the children at Galen. The members have been active in all types of war and Red Cross activity, and support was given to the cancer drive.

Mrs. F. B. Ross, president of the Flathead county auxiliary, Kalispell, reported that to a comparatively new organization, a visit by the state president, Mrs. P. E. Logan, proved both instructive and delightful as she presented the auxiliary work and they became better informed. The women were so interested that they asked for an additional meeting in the evening. At this time Mrs. Logan gave a report of the mid-year board meeting of the national auxiliary, which she had attended Nov. 19, 1943, in Chicago. A blood bank sponsored by this auxiliary has been a great source of interest. Donors have been plentiful and the whole community has shown a great deal of interest in this project. The medical men have used the plasma frequently and are well pleased to have it on hand and ready when needed. In order to support this activity the members are working constantly to raise funds.

Mrs. J. H. Garberson, president of the Southeastern auxiliary, Miles City, reported for the most recently organized auxiliary. Efforts were made by the medical society to have the auxiliary created and two preliminary meetings were held to effect this, one Sept. 23, 1937, and one June 2, 1943, but because of the great distances and the fact that this society includes eleven counties, the handicaps were considered too difficult at this time. Following a visit by Mrs. D. E. Logan, state president, on April 12, 1943, who brought information and suggestions relative to auxiliary work, a third meeting was called on April 27, 1944, and the auxiliary was organized on that date by Mrs. P. E. Griffin, state organization chairman. The auxiliary now has a membership of twenty out of a potential twenty-four.

Mrs. Harold Schwartz, president of the Silver Bow auxiliary, Butte, reported that Dr. J. C. Shields, president-elect of the Montana state medical association, and Dr. R. F. Peterson, president of the Silver Bow county medical society, had corresponded with the president of the woman's state auxiliary, Mrs. P. E. Logan, and favored the plan for organizing an auxiliary to the Silver Bow medical society. The secretary, Dr. S. V. Wilking, invited the doctors' wives in Butte to attend a luncheon at the Finlen Hotel, on Aug. 26, 1943. Twenty-three women attended this luncheon. Others attending were Mrs. P. E. Logan and Mrs. A. L. Gleason, state officers, Mrs. David Berg, representing the national auxiliary, and Mrs. L. F. Hall. Following the luncheon Mrs. Logan, in the absence of the state organization chairman, Mrs. P. E. Griffin, presided during the organization. Mrs. R. C. Monahan was elected temporary chairman, and Mrs. P. E. Kane, temporary secretary. After considerable time was spent in discussing aims and methods of the woman's auxiliary and results to be obtained, it was decided to organize an auxiliary to be known as the Silver Bow county auxiliary. A committee on nominations consisting of eight members was appointed to bring in a report at a meeting in September. At

the September meeting the following officers were elected:

President—Mrs. Harold Schwartz
Vice President—Mrs. T. J. B. Shanley
Secretary—Mrs. P. E. Kane
Treasurer—Mrs. C. B. Rodes.

Dr. J. C. Shields, Dr. S. V. Wilking and Dr. J. E. Garvey gave instructive and educational talks during the year, and congratulated them on being organized. The members of this auxiliary have served both as individuals and as a unit in several phases of Red Cross work, also contributed from their treasury to the Red Cross drive and in purchasing cookies for the USO. At the February meeting Mrs. Logan presented an educational report of the mid-year board meeting of the national auxiliary held in Chicago, and Mrs. Gleason spoke words of encouragement on the splendid spirit shown by the members, urging that success is only through cooperation. The president announced the appointment of Mrs. Glenn Carmichael as chairman for the annual convention.

Dr. J. C. Shields, the newly installed president, brought greetings from the Montana state medical association. Dr. Shields emphasized to the women of the auxiliary the importance of having accurate information on every subject pertaining to medical legislation.

Dr. J. P. Ritchey's message to the auxiliary was read by Mrs. J. M. Nelson. In it he spoke of the doctors at war and at home, all giving their entire time to the service of their country. He mentioned that the woman's auxiliary is a vital factor in our scheme of things to all the doctors. He said "May I say that unity of purpose and of action among the doctors must reach still greater perfection and that a friendly, smoothly-working woman's auxiliary in any town can do more than almost anything else to help this unity along. Doctors are almost always strongly individualistic, when their wives get together and work together the doctors get together too, and like it."

Dr. E. M. Larson, president of the Montana state tuberculosis association, presented a resolution recommending that the woman's auxiliary to the Montana state medical association urge the Congress of the United States to include in the immediate postwar building program an appropriation for the construction of at least a one hundred-bed addition to the State Tuberculosis Sanatorium at Galen for the use of the Indians; also that the Montana legislature be urged to enact appropriate legislation under which the state of Montana may cooperate with the Indian Service in providing additional beds for the care of tuberculous Indians in the state of Montana. After discussion, it was voted to send a letter to the United States congress and the Montana legislature urging the importance of immediate action.

Mrs. H. W. Peterson, state commander of the women's field army for the control of cancer, briefly addressed the auxiliary.

Captain Lenore Amerman, WAC officer assigned to the Ninth Service Command of the Army from the Surgeon General's office, Washington, D. C., addressed the auxiliary and told of the great need for medical technicians in the army. She also spoke of some of her experiences in her work.

The proposed substitute constitution and by-laws were presented, and after animated discussion, were adopted.

Mrs. Dodge, treasurer, reported that four women living in districts where there are no organized auxiliaries, had paid their dues and become members-at-large while attending the convention.

A very delightful luncheon was held on Friday in the Round-up Room of the Finlen Hotel. This was sponsored by the Butte auxiliary, with Mrs. Glenn A. Carmichael, convention chairman, presiding. Several guests and a large group of members attended this luncheon, which was carried out in the military motif. During the luncheon musical numbers were rendered.

The annual banquet was held Thursday evening at the Butte Country Club, in conjunction with the Montana state medical association. Dr. P. E. Kane of Butte acted as toastmaster. The tables were lovely with yellow roses furnished by the Silver Bow auxiliary. Following the dinner an address was given by Mr. E. G. Toomey of Helena. Following Mr. Toomey's remarks a delightful floor show was presented, after which dancing was enjoyed by many.

The following officers were elected for the year 1944-45:

President—Mrs. J. M. Nelson, Missoula.
President-elect—Mrs. P. E. Griffin, Billings.
First Vice President—Mrs. I. J. Bridenstine, Terry.

Second Vice President—Mrs. F. B. Ross, Kalispell.
 Secretary—Mrs. L. R. Alderson, Missoula.
 Treasurer—Mrs. A. A. Dodge, Kalispell.
 Directors—Mrs. J. H. Irwin, Great Falls, Mrs. Harold Schwartz, Butte.
 Holdover Directors—Mrs. D. T. Berg, Helena, and Mrs. E. S. Murphy, Missoula.

Mrs. R. B. Durnin, Great Falls, chairman of courtesy, expressed the appreciation and thanks of the state auxiliary to the convention committees, the president and all members of the Silver Bow auxiliary for their hospitality, entertainment and every effort in making the third annual convention a success.

Mrs. A. L. GLEASON, *Secretary*
 Mrs. P. E. LOGAN, *President*

Address of the President of the Woman's Auxiliary to the Montana State Medical Association

The third annual convention of the woman's auxiliary to the Montana state medical association is being held during one of the most critical times in the history of our nation. It is not necessary to remind you of the conditions under which we are meeting. We are fortunate to be able to gather here today with a feeling of security and peace. Let us never be unmindful that for this we are indebted to our boys in the service who make this possible.

In 1942 I was honored by being elected president-elect of this organization for 1943. This is a wise procedure as it provides a year of study, observance and preparation for the responsibilities of the coming year. The material forwarded to me by the officers and chairmen was reviewed carefully and every endeavor made to acquaint myself with the work of the organization.

In 1943 I assumed the leadership of the woman's auxiliary to the Montana state medical association. Only to those who have headed state work in Montana can the enormity of the task be understood. Our state is so large that much has to be done through correspondence, which is not always satisfactory. During the year I have written more than three hundred letters in carrying on auxiliary business.

It has been the privilege of your president to visit the seven county auxiliaries during the year. I appreciate the many kindnesses and gracious hospitality extended to me during these visits. You will be surprised to learn that my work has necessitated traveling thirty-four hundred miles in Montana alone in the interests of auxiliary work. By such visits a president increases her knowledge and understanding of the problems of the auxiliary and is, therefore, better equipped to guide the work of the organization, and also finds talent for leadership.

Intelligent and well planned effort is manifested in the reports of the officers and committee chairmen. I cannot commend too highly the splendid work done by the county auxiliaries and it is evident that the work is growing with force and interest.

I attended the mid-year board meeting held in Chicago, Nov. 19, 1943. It is a privilege to be eligible to attend such a gathering and receive the inspiration and education that the discussions have to offer. I took notes and prepared a report, which is on record in the secretary's file.

I am sincerely grateful to the officers, directors, county presidents, committee chairmen, and all auxiliary members for their support, loyalty and cooperation. By your efforts you have made the Woman's Auxiliary to the Montana medical association an outstanding organization in this state. I also wish to express my gratitude to Dr. J. P. Ritchey as chairman of the advisory council for his timely suggestions and encouragement; and to Dr. T. F. Walker for his kindly assistance in arranging our program, and to the state medical association for allowing space to the Woman's Auxiliary in the state convention program.

As a medical auxiliary we should assume our share of the responsibility of safeguarding the ideals of American medicine at all times, to aid in securing better medical legislation and further the program on health education.

As I leave this office, may I extend my best wishes to the incoming officers for a successful year.

Mrs. P. E. LOGAN, *President*

Brucellosis*

(Undulant Fever)

N. Wells Stewart, M.D.

Lead, South Dakota

BRUCELLOSIS is an infectious disease of world-wide distribution. Its early recognition as a disease entity in the Mediterranean area led to its designation as Malta Fever or Mediterranean Fever. It is primarily a disease affecting domestic animals, but under certain circumstances is transmissible to man.

In 1886 Bruce isolated from the spleen of a patient who had died of the disease the causative organism which he later called *micrococcus melitensis*. The term *brucella* has been accepted for the group of bacteria responsible for the disease in human beings and animals. Brucellosis indicates the infection produced by the brucella group. Bang isolated the organism of infectious abortion of cattle, *bacillus abortus*, hence Bang's disease.

In 1918 Alice Evans demonstrated that for all practical purposes the organism of Malta fever and the organism of the infectious abortion of cattle were indistinguishable. The organism usually associated with goat infection is termed *brucella melitensis*, while the organism of infectious abortion in cattle is termed *brucella abortus*.

*Presented at the meeting of the Black Hills Medical Society at Lead, South Dakota, February 24, 1944.

A third organism associated with the infection in swine is called *brucella suis*.

It is generally believed that the melitensis variety is the most highly infectious; the abortus the least infectious, and the suis variety occupies an intermediate position. The suis organism has been recovered from cow's milk. While the suis infections are more common in the hog raising states, the abortus type is the more widely distributed throughout the United States. The abortus strain produces more insidious and less severe symptoms and signs than those produced by either the melitensis or the suis varieties.

The two most important modes of conveyance of the infection to man are: first, and most commonly, the ingestion of raw goat's or cow's milk or unpasteurized dairy products; and second, direct contact with infected fresh animal tissues. The skin, through abrasions and wounds, may act as a portal of entry. There is no evidence of man to man transmission of the disease.

The growth of interest in the disease is indicated by the increase in the number of cases reported. In the

United States in 1926 only 46 cases were reported, by 1930 the number had increased to 1453, and in 1937, 2497 cases were officially reported to the United States Public Health Service. In Minnesota only 8 cases of brucellosis were reported in 1927; 93 in 1939—(183 in Iowa, 372 in Oklahoma). In 1942, 268 cases were reported in Minnesota. Of the 7440 blood specimens sent in for agglutination tests, only 477 gave a typical positive test in dilution of 1:80 or above. Of 398 blood cultures only 29 (7.2 per cent) were positive. South Dakota figures show that there were 8 cases reported in 1939 and 1940 each, and 31 cases in 1943. The accompanying table shows that most cases were reported during the summer months, June through September. In 1932-34 there were 287 undulant fever agglutination tests and in 1940-42 there were 1153.

	1939	1940	1941	1942	1943
January	0	0	0	0	0
February	0	0	0	1	0
March	0	1	0	0	1
April	0	0	0	1	0
May	0	1	0	0	1
June	1	1	3	0	0
July	3	0	3	1	11
August	1	0	2	1	7
September	2	0	0	0	6
October	0	0	0	2	2
November	1	1	0	0	2
December	0	0	0	0	1
	8	4	8	6	31

The following figures are relative to the number of blood specimens forwarded to the Vermillion and Pierre Laboratories for agglutination tests.

	1932-34	1934-36	1936-38	1938-40	1940-42
Positive	16	71	66	57	81
Negative	271	331	523	888	1072
	287	402	589	945	1153

A great many acute and chronic cases undoubtedly are never diagnosed. That more and more tests are being submitted shows a growing interest in the diagnosis of the disease. Brucellosis occurs more commonly in men than in women. It is uncommon in children; in about 10 per cent of recorded cases in children the ages ranged between five and fifteen. Children seem to have a greater natural resistance to the disease than adults. Severe infections are seldom seen in children although mild infections are not unusual. The differential diagnosis in the mild cases, from miliary tuberculosis or subacute bacterial endocarditis, may keep one in suspense for several weeks.

The diagnosis of brucellosis is difficult to establish, especially in the chronic form, without the aid of laboratory tests. Acute and chronic forms differ markedly in symptomatology. Many cases are undoubtedly subclinical or latent and asymptomatic. If brucellosis is suspected information should be obtained as to the type of work engaged in; possible contact with aborting cattle, sheep or swine or with horses with fistulous withers; the source of milk supplies and of dairy products used; where vacations or week-ends have been spent and possible consumption of unpasteurized dairy products.

Acute brucellosis may be suspected if the patient presents himself with headache, malaise, weakness, fever and night sweats. The incubation period may vary from five to forty days. The onset of symptoms is usually gradual. Fatigue, irritability, apprehension and headache may occur for one to two weeks, followed by fever necessi-

tating rest in bed. Pain in the chest with an unproductive cough may suggest respiratory infection. The onset may be sudden with fever, chills and drenching night sweats. (The fever or temperature may be either elevated or subnormal during the same day. The chills may amount only to a chilly feeling, fleeting in character and not accompanied by fever). Physical examination is essentially negative, but later, evidence of localization may develop. The liver and spleen may be enlarged and tender. Hepatitis and cholecystitis with jaundice may appear. There may be a mild anemia. Inflammation in genital tract (orchiditis, prostatitis, epididymitis, seminal vesiculitis), in men, and abortion, in pregnant women, may occur. An acute enteritis may occur. The disease may attack any part of the human body. Ocular disease may occur as a complication. A skin rash may appear and loss of weight occur when fever is prolonged.

The diagnosis of chronic brucellosis may be very difficult. The disease should be suspected when there is a history of fever of unknown origin persisting for several months; weakness and mental depression may be the chief complaints; nervousness, loss of weight and generalized aching occurs. The temperature may or may not be elevated.

An absolute diagnosis can be made only on positive blood cultures. However, in general practice these are too often negative in both acute and chronic cases to be of any value. Agglutination tests are more often positive, but must be carefully evaluated when occurring in a dilution of only 1:80 or less. Acute cases may never show agglutination and marked agglutination may occur long after the acute or active infection.

The skin test is fairly reliable, but has the same significance as the Mantoux test for tuberculosis. No matter how strongly positive, it does not mean that active disease exists. The test is performed by injecting 0.1 cc. of brucellergen intracutaneously in the flexor surface of the forearm. It should be read forty-eight hours after injection. The test dose should be small, 0.1 cc. of diluted vaccine may be used and should contain approximately 20,000 organisms.

Blood studies in acute brucellosis commonly show a secondary anemia depending on the severity and duration of the infection. A leucopenia may develop or there may be a normal or slightly elevated count. Lymphocytosis is a common finding. The sedimentation rate of the erythrocytes is usually normal.

We know of no dependable treatment for brucellosis. Sulfonamids, of no value in chronic brucellosis, may prove to be of some value in acute cases, but results so far are not conclusive. Proper symptomatic treatment contributes to the comfort of the patient and may shorten the course of the disease. The following forms of treatment may be employed: (1) general care, (2) immune serum, (3) vaccine, (4) toxic filtrates, (5) chemicals, (6) artificially induced fever. Recently a preliminary report has been published on the use of radioactive colloidal manganese.‡

The prevention of the disease can be said to be dependent upon four factors: (1) pasteurization of milk and cream, (2) eradication of brucellosis in domestic

‡Colmetanese is a preparation furnished by the Farnsworth Laboratories.

animals, chiefly in cattle and hogs, (3) prophylactic vaccination and preventive measures by those coming in contact with cultures of brucella or with the disease in animals, (4) public health education of farmers and husbandmen and of the public in general as to the danger of consuming raw milk and other unpasteurized dairy products.

CASE HISTORY

S. R., a 29-year-old white male, on May 8, 1943, complained of fever, chills, profuse sweats, diarrhea and vomiting. He also complained of aching about the right eye which has persisted to date. Temperature on May 8 was 102, and May 9 was 103. The profuse sweats continued for five days and then subsided. He was admitted to the hospital May 11 and was discharged May 15 with a diagnosis of enteritis and la grippe. His past history was negative except for pleurisy pains during the past year. Physical examination was negative except for tenderness in the right abdomen from the rib margin down, blood pressure 110/56. The leucocyte count was 4,300 on May 11 and 4,800 on May 12.

After leaving the hospital he continued to have profuse sweats, loss of weight, and chills. The latter occurred approximately every four days accompanied by a slight elevation in temperature and followed by a subnormal temperature. Undulant fever was suspected and agglutination tests showed a positive reaction to a dilution of 1/500. A ten day course of sulfanilamide did not show any noticeable improvement in the patient.

He had a history of having consumed raw milk and cream at home and at the ranch where he spent week ends. Raw milk had been consumed at home for one month prior to the onset of his illness. He was admitted to the hospital July 21 for treatment with vaccine and observation. Physical examination was negative except for injection of the right eye. The right pupil remained larger than the left, and reacted sluggishly to light and accommodation. Temperature was 97 to 98.4 although chills still occurred every three to four days. On July 26 a skin test was given and a mildly positive reaction resulted. Vaccine was then given subcutaneously in increasing doses with a response consisting of fever and chills during the first few doses and then subsiding with subsequent full doses. He was discharged August 18. Leucocyte count remained about 9,000, there was no anemia, a differential count showed lymphocytes 61 per cent and polymorphonuclears 20 per cent. His subsequent history is that of continued fever and chills at intervals and pains in the chest. He returned to work September 22.

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Infertility and Sterility*

A Six Year Study

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THE question "Why don't we have children?" has been asked by increasing numbers of couples in this country during the past six years. The appearance of several articles in lay publications about five or six years ago whipped public interest to a fever heat and this interest was enhanced by the entry of this country into the war. Every childless couple seemed anxious to have a child before the husband went into the army. Much misinformation has been appearing in the daily papers and current magazines about the successes achieved in cases of infertility and even about the causes of infertility and the methods used to treat it. It is estimated that 10 per cent of married couples in this country are involuntarily infertile or sterile.

To obtain a clearer idea of the causes of infertility and sterility and to find out how many cases of the former were cured this study was undertaken. At the outset it became apparent that many of these patients were shoppers or wanderers. To be seen in the sterility clinic of

the New York Hospital a patient must first go to the Gynecology O.P.D. clinic and be referred from there to the sterility clinic. (Chart 1). An average of 145 such patients are referred annually to the sterility clinic and only about 62 appear. Of these 62, nineteen fall by the wayside for one reason or another during the investigation, leaving only an average of 43 out of the original 145 who are worked up completely each year. The necessity for a thorough history and a complete investigation of husband and wife cannot be emphasized too strongly. It is the duty of the physician to explain to the patient at her first visit what a complete investigation entails and the importance of continuing with one doctor until this is completed. Too often the physician when consulted by one of these patients tells them not to worry, just to wait or, what is worse, gives them a series of injections to "strengthen" the ovaries without even bothering to do a general and a pelvic examination. The patient soon becomes discouraged, consults another doctor and the wandering starts. If a physician is not equipped to do a complete investigation it would be better for him to refer the individual and her husband to someone who is

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so equipped that there may be continuity in the study of the case.

I wish to report in this paper the patients seen in our sterility clinic during the six-year period from January 1, 1938, to December 31, 1943. With only a few exceptions these patients have been sterile for two years or more, the average number of years of sterility in the whole group being 4.3. During this six-year span, we saw 372 patients and of this number 37 made only one visit and 74 were not worked up completely. There are many reasons for the one visit and incompletely worked-up groups. A fair percentage just didn't return, another large part was incomplete because the husband refused to be examined; in others the investigation was discontinued by us because some abnormality found early made the possibility of a pregnancy quite remote.

There were 261 patients studied completely in this six-year period. The commonest cause of infertility was the husband. He was to blame 86 times or in 33 per cent of the cases. All of the husbands were required to go to our male sterility clinic or, if this was impossible, they were advised to be examined privately by an urologist equipped to do a complete semen examination.

In many of the patients who made one visit or had an incomplete workup the investigation was stopped because of a grossly defective semen specimen. Actually the male is probably the cause of the infertility in many more than 33 per cent of the cases. Hotchkiss and MacLeod have found a defective specimen in 43 per cent of their examinations. In 10 of the patients who became pregnant the husband was considered to be wholly or partly to blame for the period of infertility; thus a defective specimen does not preclude the possibility of a pregnancy. Azoospermia alone is an absolute bar to pregnancy taking

place. However, there are certain types of defects in the specimen that make us feel that pregnancy is unlikely. (Chart 2).

Reliable evidence has accumulated recently to show that the average semen specimen of fertile man has a volume of 3 to 3.5 cc. and contains from 100 to 120 million spermatozoa/cc. It has been claimed that specimens containing less than 66 million/cc. have little chance of producing conception but Hotchkiss has shown that severan men of known fertility seldom deliver more than 30 million/cc. At the New York Hospital, it has been our experience that about 60 million/cc. is the lower limit for conception in all but the most exceptional cases. We have several cases on record where semen counts varying from 3 to 15 million/cc. have produced conception and in cases where there was little reason to doubt the probity of the parties concerned. But it should be emphasized that such cases are the exception and that the female partner in question undoubtedly would be found to be "highly fertile."

In so far as motility is concerned, there is no reason to doubt that the fertility of any given semen specimen is closely associated with the motile activity of the cells and that the motility should be of reasonably high quality. It is not easy to define "quality"—an accurate analysis of motility comes only with experience. However, in a normal specimen, the spermatozoa should show rapid forward movement with little agitation or deviation in their progress. It is commonly stated that from 90 to 100 per cent of the spermatozoa should be active, but, in an analysis of thousands of specimens, we have seldom found more than 70 per cent of the cells to be motile and the average number is nearer 60 per cent. Where the percentage drops below 30 per cent motile, even in the presence of a normal count, the specimen is suspect.

A morphological examination requires examination of about 300 cells on a dry, stained film of semen. The predominant cell shape in most semen specimens is the oval-head type and in normal specimens the percentage of this type ranges from 85 to 95 per cent. The so-called "abnormal" forms found may have relatively enormous heads, two heads, two tails, amorphous heads, or in some cases, no obvious heads at all. Only in exceptional cases have we found specimens which contained more than 25 per cent of these abnormal types and there is no real evidence in the literature which relates abnormal sperm morphology with failure to conceive, habitual miscarriage or malformed babies.

It might be of interest to the gynecologist who is required to advise on the proper spacing of intercourse for successful conception that the male with a semen specimen of good quality can have intercourse on three successive nights without unduly impairing the count, pro-

CHART 1
AVERAGE YEARLY REFERRALS

145 patients a year referred from Gynecology to Sterility
62 patients actually go
43 patients worked up completely
In this series of sterility patients, 1-1-38 to 12-31-43
261 worked up completely
74 had some work-up
37 made one visit
372 patients actually seen in six years

CHART 2

The New York State Hospital—UROLOGY—Semen Analysis
Date—2-1-43. Number—4555

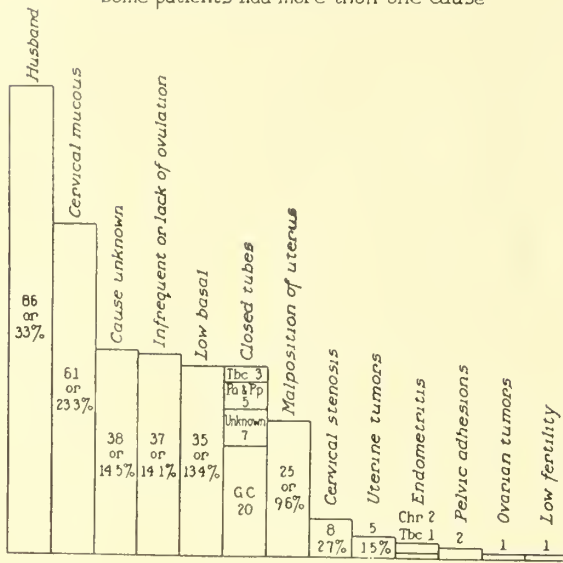
Name—Smith, J.
Volume—3.2 cc. Viscosity—Normal. Turbidity—Normal.
Motility—1 hr.—300 crossing HPF in 10 sec. 500 in total HPF. 60% Motile. —4. 6 hrs.—225 crossing HPF in 10 sec. 500 in total HPF. 45% Motile. 2 to 3+. 24 hrs.—10 crossing HPF in 10 sec. 100 in total HPF. 10% Motile. 1— to 1+.
Count—Per cc., 130,000,000; total, 416,000,000.
Morphology: Oval, 93%; large, 2%; small, 1%; round, 1%; tapering, 2%; duplicate, 1%; amorphous, 0.
GOOD SPECIMEN.

CHART 3
CASES OF SUSPECTED MALE STERILITY

Number of Cases Examined	Number Probably Sterile	Number Admitting Gonorrhoea	Number with Gonorrhoea History and Probably Sterile	Gonorrhoea History and Azoospermia	Azoospermia with no History of Gonorrhoea	Azoospermia of Etiology other than Gonorrhoea ¹
577	248 (43% of 577)	109	84 (78% of 109)	50	38	29 (79% of 38)

¹ Hypogonadism, bilateral cryptorchidism, etc.

CHART 4
Causes of Sterility in 261 Cases
Some patients had more than one cause



vided he has had a sexual rest of about a week prior to the first intercourse in such a series. The count will show an appreciable drop at the third intercourse but not enough to affect unduly the potential fertility of the specimen. However, it is our practice to advise our patients who have regular cycles (26 to 32 days) to begin on the ninth or tenth day of the cycle and have intercourse every other night for about eight days. They should also not neglect other times in the month since pregnancies are known to have followed intercourse immediately after the menses are over or even during menstruation. (Chart 3).

In regard to the causes of male infertility, a study of approximately 600 men attending the male sterility clinic of the New York Hospital for routine examination of their semen, offers interesting data. In most cases, the wives of these men were under examination in the female sterility clinic. Of 577 men examined, 248 were considered "probable sterile," either because of azoospermia or a deficient count and/or motility. Of the latter group, 109 admitted a history of gonorrhea and 50 of the 109 had no spermatozoa in their semen. Another 34 had few spermatozoa in their specimens so that 78 per cent of the group admitting gonorrhea were almost certainly sterile. This does not mean that a high percentage of men contracting gonorrhea will become sterile because we see only the gonorrhea cases having difficulty in producing conception and not the much greater number who escape any permanent damage from the gonococcus. But it does mean that in examining the male partner of the sterile marriage, a previous history of gonorrhea is important. Male sterility of gonorrheal origin is usually exemplified by azoospermia due to bilateral occlusion somewhere between the testicle and the urethra and is not caused, as a rule, by any damage to the germinal epithelium, which may function normally for many years in spite of the absence of spermatozoa in the ejaculate. In certain of these cases where the occlusion is low in the

scrotal portion of the ductus deferens, an anastomosis of the patent end of the ductus deferens to the epididymis may be attempted with some hope of success.

The other more obvious causes of male sterility are those which result from hypogonadism, mumps, and bilateral cryptorchidism. So far, no hormone therapy has been of any consistent aid in such cases.

The greatest number of male infertility cases fall into the group of obscure etiology. These patients have a count ranging from a few isolated spermatozoa to 30 to 50 million per cc. Usually poor or abnormal motility is associated with the low counts. These patients are often overworked or working under pressure and are below par physically. Insistence on adequate rest, exercise and sunshine, a well balanced diet, thyroid therapy if the basal rate is low, extra vitamin D and large doses of vitamin B complex will not infrequently produce a remarkable improvement in the specimen. Febrile illnesses will produce in some cases a marked reduction in the sperm count starting about two weeks after the severe part of the illness and lasting at times six weeks. Unfortunately at present there is no specific therapy for the treatment of male infertility. (Chart 4).

The next commonest cause in our series was some abnormality of the cervical mucus. This occurred 61 times or an incidence of 23.3 per cent. We feel that the cervical mucus as a cause of infertility has never been properly emphasized. Dr. William Cary, who is in charge of the sterility clinic at the New York Hospital, and who has contributed much to our present knowledge of the problem, is responsible for our great interest in cervical mucus. The abnormalities fall roughly into three groups. First, the grossly infected cervix and endocervix with profuse mucopurulent discharge; this is usually seen in patients who have had at least one child but also in the nullipara who has had gonorrhea or a trichomonas infection. If it does not respond to the usual therapy of douches, suppositories, tampons or topical applications, light electrocoagulation may be necessary. The coagulation should preferably be done prior to ovulation but not just prior to menstruation because of fear of ascending infection. Three severe pelvic infections are known to have occurred in our clinic, two from coagulation or cauterization, and one from polypectomy done just prior to menstruation. We prefer coagulation to cauterization and we would prefer to coagulate several times rather than destroy too many cervical glands and put the patient into the second group which is a lack of or great decrease in the cervical mucus. This is quite often the result of a too thorough coagulation or cauterization. We feel that these methods are resorted to too quickly for the treatment of a mild endocervicitis or a simple cervical erosion. The importance of cervical mucus at the time of coitus in helping the sperm along its way and probably supplying it with nourishment is becoming more and more apparent. Absence of this normal mucus may definitely reduce the chances of pregnancy occurring or at times actually prevent it. Frequent dilatation of the cervix and massage of the cervical canal to stimulate the remaining glands are the only methods of treating this lack of mucus and these are not too successful.

The third group, and the largest of the three, are those patients who when examined around ovulation time have a thick, tenacious, at times cloudy cervical mucus instead of the clear thin semi-fluid, normally occurring, mucus. The patient herself is not conscious of any discharge, in fact there often is no discharge, but when an attempt is made to aspirate this abnormal mucus it cannot be drawn up in the cannula. This condition is due to a very low grade infection of the endocervical glands which causes them to secrete a thick cloudy mucus. Treatment is simple but often prolonged. The cervical canal is massaged with dry gauze or a dry applicator and then with an applicator soaked in one or two per cent silver nitrate or two per cent mercurochrome. Stronger antiseptics may destroy glands rather than stimulate them. Gentle cervical dilatation with small dilators is necessary if the abnormal mucus is associated with cervical stenosis. The treatments are usually given twice a month and often over a period of several months. Coagulation or stronger antiseptics are resorted to in only the few cases entirely resistant to treatment.

Postcoital tests done in patients with thick mucus usually show no spermatozoa or only dead ones. If done immediately after intercourse the spermatozoa can be seen attempting to penetrate the mucus but making no progress. Poor cervical mucus which improved under treatment was thought to be a factor in the infertility of 13 patients who subsequently became pregnant. Fifty patients with poor cervical mucus had poor or negative postcoital tests. We routinely did the postcoital tests in the morning clinic after the patient had had intercourse the night before. If the first test was poor in the presence of good mucus the interval between intercourse and the examination of the mucus was decreased and a good test was usually obtained if the husband was normal.

In 38 of the patients, or 14.5 per cent, after a thorough investigation of both husband and wife had been completed, no cause for the infertility could be found. It was necessary for us frankly to tell this group that they and their husbands were both normal and that in the light of present knowledge no treatment was indicated. We can postulate one of a number of reasons for the failure of this group to become pregnant. It might well be a matter of time; if both parties to a marriage have a low fertility index, two, three or even four years might not be long enough to wait. It is possible that some of the women do not ovulate despite the finding of a secretory endometrium by biopsy. Four patients who subsequently became pregnant had no explanation for their infertility.

Lack of ovulation or infrequent ovulation was the explanation for the infertility in 37, or 14.1 per cent. The presence or absence of ovulation can be theoretically determined in one of four ways: endometrial biopsy, vaginal smears, basal rectal temperature or possible changes in the electric potential of the body. In this series only the first two were used. The microscopic examination of a specimen of endometrium taken just before a menstrual period was thought at one time definitely to establish proof of or lack of ovulation. Recent work casts some doubt on this premise. Shorr has repeatedly re-

ceived a report of secretory endometrium in patients whose vaginal smears definitely show a lack of any evidence of ovulation. Other observers have corroborated this finding. The theory at present is that enough luteal-like changes take place in a mature but unruptured follicle or an atretic follicle to produce secretory changes in the endometrium.

The vaginal smear is well established as a means of determining ovulation and of determining the type of hormonal imbalance present if ovulation does not occur. It has the disadvantage of necessitating daily smears being taken by the patient, getting these smears to the doctor who must stain and interpret them at once if the correct time for coitus is to be determined. Considerable experience is necessary for the interpretation of these smears and the average practitioner lacks the time to obtain the necessary experience.

The use of the fluctuation in the morning rectal temperature to determine ovulation seems at present to be the easiest method and possibly the most satisfactory. The characteristic sharp fall and subsequent rise around the time of ovulation is seen if the temperature is plotted against the day of the month. These graphs show that anovulatory cycles may occur in women who menstruate regularly. The successful use of this method of determining ovulation has recently been reported by Tompkins who was successful in advising a number of patients when they could best become pregnant. Rubinstein has used a combination of basal body temperature and vaginal smears to study functional sterility in order to advise day of coitus if ovulation does occur and to choose the proper therapy and the time for it, if ovulation does not. The use of rectal temperature charts routinely and of vaginal smears in those patients who do not ovulate to determine correct type of therapy, if any, seems to us to be the more sensible approach in a complete sterility investigation. Three patients in our series with infrequent ovulation or lack of ovulation became pregnant after therapy. If a patient ovulates during most of her cycles we do not feel any therapy is indicated; but if she ovulates rarely or never we see no reason why appropriate therapy cannot be tried providing the patient is warned that her chances of success are small and that treatment may be necessary for a long period of time. The indiscriminate use of hormone therapy on the assumption that ovulation is not frequent enough or does not occur should be discouraged. Even with appropriate therapy it is doubtful if ovulation can be produced in more than 5 per cent of anovulatory women.

We have had no experience with the use of changes in the electric potential of the body as a means of determining ovulation. It would seem that this method is still in the experimental stage and its general use will have to be postponed until more definite data are available.

A lowering of the basal metabolic rate was thought to be the reason in 35 or 13.4 per cent of the cases. We gave thyroid extract tablets to all patients whose metabolism was minus 6 or below, the dosage naturally depending on the basal reading. The metabolism was repeated at monthly intervals and the dose of the drug adjusted until the basal rate was above minus 6 while the patient

CHART 5

Causes of Infertility in 42 Patients Who Became Pregnant

Some patients had more than one cause



was on the drug. The correct dose was then continued indefinitely; if the patient became pregnant it was continued until about the seventh month. Marked fluctuations were noted; so often the metabolism would even go down while the patient was on the drug that it was felt frequent repetition of the test essential. Nine of the patients who subsequently became pregnant had a low basal metabolism that was corrected.

What always has been thought the commonest cause of sterility, namely, closed tubes, was present in only 35 of the patients, or 13.4 per cent. Twenty of these were due to gonorrhoea and five followed abortions or a puerperal infection. Three cases were tuberculous in origin and in seven there seemed to be no cause for the occlusion of the tubes, if the patients' histories are to be accepted. Interestingly enough, three of the patients who had definite closed tubes at one time subsequently became pregnant. We routinely do a tubal insufflation test immediately after a period is over. If three insufflation tests are negative, a lipiodal test is done. We performed 30 lipiodal tests in this series, none being done on the patients with tuberculosis and two others. The treatment of occluded tubes is, and always has been, unsatisfactory. Occasionally pregnancies occur after an insufflation test in which high pressures (180 mm.) were maintained for a few moments then with a sudden fall in pressure the gas flowed freely at low pressures or after several insufflations in which the gas flowed successively at lower pressures. Pregnancy also follows hysterosalpingograms at times. Whether the tubes in these cases were blocked or merely in spasm is difficult to determine; also, if the cannula used did not pass the internal os the temporary blockage may be cervical in origin either from thick mucus or a tight internal os.

If insufflation tests are negative, hysterosalpingograms will tell us the site of the block. If this is at the cornua, operative attempts to open the tubes will probably be unsuccessful, but if it is well out toward the fimbria or at the fimbria there is some hope for surgery. I do not have time to discuss the many operations reported for opening

CHART 6
104 CASES

Cause	Percentage	Incidence in 104 Cases	Pregnancies
1. Husband	44 or 42.3%	[1]	6
2. Mucus	19 or 18.2%	[3]	2
3. Cause unknown	21 or 20.1%	[2]	1 (1)
4. Lack of ovulation	8 or 7.7%	[7]	
5. Basal	19 or 18.2%	[4]	5
6. Closed tubes (G.C. & P.P. ?)	8 or 7.7%	[6]	0
7. Malposition	10 or 9.6%	[5]	3 (1)
8. Cervical stenosis	0		0
9. Uterine tumors	0		0
10. Endometriosis	1 or 0.9%	[8]	0 (1)
11. Pelvic adhesions	0		0
12. Ovarian tumors	0		0
13. Low fertility	0		0

(1) are cases listed under another cause.
[] numbers in brackets indicate incidence in 104 cases.

closed tubes. We have had some success with the method described by Gepfert when the block is at or near the fimbria.

It must be emphasized that this is a selected group of patients and many who had gonorrhoea and doubtless closed tubes were weeded out in the Gynecological clinic and never reached the sterility clinic.

Malpositions of the uterus were thought to be the cause or one of the causes of the infertility in 25 patients, or 9.6 per cent. These were for the most part retroversions, almost never retroflexions or antelexion. An acquired retroversion may quite often be a cause of sterility and when the uterus is replaced pregnancy often results. How much of a factor a congenital retroflexed or acutely antelexed uterus is in an infertile person is difficult to say. It is our opinion that either condition may delay pregnancy but is not *per se* a cause. The acutely antelexed uterus is often associated with other signs of underdevelopment and may be only a part of the whole picture. Retroflexion is congenital and correction is often of no value. Seven patients in whom a malposition was corrected subsequently became pregnant. Three suspensions were done in the whole series, one of these becoming pregnant. The other patients had the retroversions corrected by pessaries.

Cervical stenosis was thought to be a factor in eight patients, three of whom became pregnant after dilatation of the cervix. This condition is often associated with poor mucus or absence of mucus and there is usually inadequate drainage for the cervical secretions.

The presence of uterine tumors was considered significant in five cases, purely on either mechanical blockage of the tube or compression and distortion of the endometrium. Two patients became pregnant after the tumors were removed.

The other groups are all small; endometritis, one tubercular and two chronic in three cases, pelvic adhesions in two, ovarian tumors in one and low fertility in one. The latter patient, although she ovulated regularly, had required seven years to become pregnant the first time.

Artificial insemination was tried in 13 patients, using the husbands' specimens. No pregnancies were achieved as a result of the insemination, but in several of these patients it was done only once. Because of the necessity

of doing this procedure at a definite time in the month and because of the inconvenience of collecting a specimen we felt that this was not a procedure to carry out routinely in a hospital out-patient clinic. No artificial inseminations were done using a foreign donor, but one of the patients, whose husband had azoöspemia, became pregnant when this procedure was done by a private physician.

The use of a pre-coital douche of Ringer's glucose solution as an aid to achieving pregnancy in those patients who are apparently normal and whose husbands are normal has recently been reported. Since the initial report by MacLeod and Hotchkiss many more successes have come to the attention of the authors. While it is impossible accurately to evaluate such successes many patients who have been trying for years without success to become pregnant have done so in a few months after using this douche. The theory behind its use is that it makes the vaginal secretions less antagonistic to the spermatozoa and that the cervical mucus may take up some of the solution and possibly provide the spermatozoa with more nourishment during its long trip through the uterus and tubes. (Chart 5).

Forty-two or 16 per cent of these 261 patients became pregnant. Other interesting points brought out in this study were: 182 of the patients had never been pregnant; 61 had had one or more abortions, 29 being induced; 24 had had one full term pregnancy; and two had had two full term pregnancies. The ages of the patients varied from 22 to 42, with an average age of 30.05 years. Sixty-two patients had had a previous abdominal operation. One hundred had had previous sterility investigations and the average number of visits to the clinic for each patient was 9.5. There was a history of poor fertility in the families of 42 of the patients and a questionable fertility history in 65.

I studied also the patients I had seen in my own practice during this six year period who had been trying two years or more to become pregnant. One hundred four cases fell into this category and 17, or 16.3 per cent, of these became pregnant. This is the same incidence of success obtained in the 261 cases previously discussed. The distribution of causes, while not identical, was about the same. I have made one chart of these causes and the successes (Chart 6). In this series three of the preg-

nancies achieved in the defective husband group followed artificial insemination using a foreign donor.

In summary, I should like to emphasize only a few points. A careful and complete history and a thorough physical examination are imperative. Investigation of both husband and wife from every angle is essential. The use of hormones in the treatment of the male is in our experience of no value and their use in the female should be discouraged unless there is an absolute indication. More attention should probably be paid to the maintenance of a normal basal metabolic rate (-6 to $+6$) and to the condition of the cervical mucus. Outlining the scope of a sterility investigation to husband and wife and frank discussion of the findings during and at the completion of the investigations would save time for both patients and doctors and save money for the patient.

CONCLUSIONS

1. Three hundred sixty-five sterility patients were studied completely and 59, or 16.2 per cent, became pregnant.
2. The commonest causes of sterility were found to be: (a) defective male specimen, (b) abnormal cervical mucus, (c) low basal metabolism in the female. In one of the largest patient groups, no definite cause was found.
3. Our greatest number of successes, 16, was obtained by improving the quality of the husband's specimen, followed by elimination of abnormal cervical mucus in 15 cases, and the normalizing of the basal rate in 14 patients.
4. Methods for the treatment of various causes are outlined.

I wish to thank Dr. John MacLeod of the Department of Anatomy, The Cornell Medical College, for his help in preparing the section on sterility in the male.

I am indebted to Mrs. Herbert Allan Dingwall and Miss Mildred Powlitis for their generous contribution of time and effort in the preparation of this paper.

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Is Vaccine Therapy of Value in Allergies of Children?*

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THE use of bacterial vaccines has long been under consideration by physicians interested in the treatment of allergic diseases. The value of this form of therapy has been disputed for many years. In 1928,

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Rackemann and Scully¹ suggested that vaccines might be able to produce a specific active immunity against certain organisms and thereby prevent infections in allergic individuals. They observed a fairly large number of patients with asthma who received various autogenous and stock vaccines in doses sufficient to produce some local

TABLE 1
Age Distribution of the Allergic Children with a History of Infections

	No. of Cases	Pct.
Up to 2 years of age	19	9
2 to 5 years (incl.)	46	21
6 to 10 years (incl.)	91	42
11 to 16 years (incl.)	58	28
Total	214	100

TABLE 2
Results of Surgical Procedures in Seventy-five Children

	Tonsillectomy and Adenoidectomy		Removal of tonsils and adenoids with puncture of antrums	
	No. Cases	Pct.	No. Cases	Pct.
Good	9	17	4	21
Fair to Poor	47	83	15	79
Total	56	100	19	100

reactions. Repeated courses of treatment from year to year with the same kind of vaccine led to the same result. If the same subjects were treated in different courses with different vaccines the influences on the allergic diseases were often similar which appeared to indicate a non-specific effect. However, in some cases one vaccine worked better than another, indicating a degree of specificity. In 1934, Brown² presented a method of diagnosis, and in 1937, a system of treatment for bacterial allergy. He concluded that where definitely positive reactions were obtained to cutaneous tests with stock bacterial proteins, gratifying results could usually be obtained from proper treatment with autogenous vaccines, stock polyvalent vaccines or vaccine-filtrates of the corresponding organisms. Any irregularities could be explained by the theories of Bronfenbrenner³ who stated that they could be due to the complexity of composition, physical state and relatively low immunogenic properties of bacterial antigens. The basic mechanism involved in bacterial allergy should be identical with that of allergy to simple proteins.

In the process of preparing vaccines by killing bacteria with heat or chemicals an alteration of the antigenic structure is bound to occur. Treatment with such vaccines may not give protection against the sensitivity to the simple protein of the unaltered living bacteria. In 1933, Krueger⁴ devised a technic for the killing of organisms without heat or chemicals. He grew the bacteria on appropriate media, washed them thoroughly, and then placed them in a special type of glazed ball mill. Fragmentation occurred and the cellular components were put into solution or suspension. Organisms killed by this method were considered to produce vaccines capable of resembling very closely the natural antigenic complexes of the living bacteria, and acting as efficient immunizing agents. The preparations were called undenatured bacterial antigens. They were found to be non-toxic which led to the suggestion that this type of vaccine would be ideal for the treatment of bacterial allergy in the child.

With this suggestion in mind a study was made of the children referred to the allergy clinics of the University and Minneapolis General Hospitals who had histories of infections. Some had the onset of their allergic disease associated with an acute infection such as influenza, pneumonia or whooping cough, others experienced repeated attacks of allergy precipitated by acute infections of the

TABLE 3
Distribution of Essential Allergens in the Children Giving Satisfactory Results to the Cutaneous Tests

	No. of Cases	Pct.
Foods alone	21	15
Foods and inhalants	25	17
Inhalants alone	32	23
Inhalants and pollens	17	12
Pollens alone	47	33
Total	142	100

TABLE 4
Results of Vaccine Therapy in Fifty-nine Children

	No. of Cases	Pct.	RESULTS
Autogenous	11	18	Poor
Stock	21	37	Fair to Poor
U. B. A.	27	45	Good, 13 cases Fair, 9 cases Poor, 5 cases
Total	59	100	

respiratory tract, and a few already had received various courses of vaccine therapy from private physicians. The purpose of the investigation was to determine whether the infection was a primary or secondary cause of the child's allergy and if primary, to establish the value of vaccine therapy. A group of 214 cases with allergic rhinitis or bronchial asthma or both was followed from two to four years. All ages were represented although the largest number of children were between six and ten years of age as is revealed in Table 1. Males were more frequent than females.

The patients were given the routine allergic work-up. The histories showed very clearly association of the symptoms of the acute respiratory infections with the allergic manifestations. One could not help but consider infection as an important part of the disease picture but the treatment which had been directed along the line of controlling the infections had not yielded satisfactory results. That there was a definite allergic background for many of the symptoms was shown by the fact that 131 cases (61 per cent) had a positive history of allergic diseases in the family and 95 children (44 per cent) already had some other well established allergic condition such as eczema or urticaria.

The physical examinations revealed quite frequently the presence of mucopurulent material in the nasal passages and rales in the bronchi. In fact, the roentgenograms demonstrated 113 patients (52 per cent) with cloudy paranasal sinuses and 92 cases (43 per cent) with bronchitis, moderate amount of bronchopneumonia, or slight bronchiectasis. The leucocyte count was consistently elevated above the normal range in 73 children (34 per cent). Could infection be the primary cause of the allergic disease? This question was difficult to answer. The plan to remove the infection already had been considered in 42 patients for they had had their tonsils and adenoids removed before admission to the allergy clinics. In 33 more cases, this surgical procedure was performed on recommendations of the clinic physicians. Nineteen of these children also had maxillary antrum punctures and irrigations. Only 13 patients had satisfactory results as is shown in Table 2. The one gratifying feature was the thoroughness with which the operative procedures did put an end to the allergic attacks in the children who responded. The discouragingly low figure for satisfac-

tory results was in agreement with the statement of Tumpeer⁵ who said that tonsillectomy and adenoidectomy per se are of little therapeutic benefit in asthma, and with the conclusion of Grove⁶ who stated that surgical procedures on the paranasal sinuses could not be expected to produce improvement of the asthmatic condition if any associated allergies of the skin-sensitive type are not taken into consideration.

Whether the infection might be the secondary or the precipitating cause was next investigated. If this was the true situation, it might be easier to find the primary cause and institute the proper treatment. Cutaneous tests were performed carefully using the liquid extracts of foods and inhalants (animal emanations, dusts, etc.) furnished in glass capillary tubes, and the pollens in the powder form with the puncture method of application.⁷ In many of the cases the skin tests were repeated before any special therapy was recommended. Elimination of the offending foods from the diet, the avoidance of the irritating inhalants in the environment, or hyposensitization with specific pollen mixtures over long periods of time under close supervision gave satisfactory results in 142 children (66 per cent). The acute infections were less in number and severity, and they practically no longer were able to precipitate allergic manifestations. The distribution of the allergens responsible for this is revealed in Table 3.

There were 59 patients who either did not respond to surgical procedures or who failed to give satisfactory cutaneous reactions to the diagnostic allergenic extracts. In these cases there was much in favor of infection as a primary cause of the attacks of allergic disease. High fevers often were present together with an abnormal elevation of the leucocyte count. The sedimentation velocity was increased in some of the cases. The children were considered good subjects for vaccine therapy outlined in Table 4.

The first step with this form of treatment was to test the patients with bacterial allergens. There, however, was no consistent response. Some of the cases with positive reactions gave poor clinical results. Other children with negative skin tests improved after the vaccine therapy was instituted. Early in the study, 11 patients received various autogenous vaccines. After several years of observation, they were discontinued for the infection re-occurred with attacks of asthma. Next, stock vaccines were employed in 21 additional cases and the results were more satisfactory. There were more local reactions of the delayed type. This phenomenon has been considered by many observers as important in obtaining good results. However, the majority have not felt that the delayed reactions are specific in nature. It was soon observed in the children receiving the stock vaccines that if there was no improvement early in the treatment, further inoculations were of little value. A change to another vaccine was indicated rather than to drag out the therapy for months or years. The undenatured bacterial antigens[‡] finally were tried in 27 cases. Starting with 0.1 cc. of the material it was administered twice each week increasing each dose by 0.1 cc. until 0.5 cc. was reached in the small child and 1.0 cc. in the larger and older child. Any immediate reactions required a slowing up in the process of increasing the dosage. After the so-called "top dose" was obtained, the inoculations were given each week. If improvement occurred the interval was increased to two or three weeks and continued through the seasons of the year when acute respiratory infections were most prevalent. After several years of observation the results were examined carefully. Thirteen children did show remarkable improvement and 9 gave a fairly satis-

[‡] Furnished through the courtesy of the Eli Lilly and Company Research Laboratories.

factory response. There were 5 failures. In view of the fact that the dosage of the undenatured bacterial antigens was so well regulated that no delayed local or constitutional reactions occurred, the patients who improved could have had a specific response to this form of therapy.

Although good results were not obtained with the autogenous vaccines, there is still some hope that this form of therapy will be of value. Crump⁸ has shown that if uncontaminated material for the culture and preparation of a vaccine is secured by means of a bronchoscope from the infections in the bronchi of asthmatic children, the final product has a good chance to give a favorable response. In fact, the good effect might be due to a specific factor. Stock vaccines, however, will continue to produce their results through non-specific reactions. The exception is the specially prepared undenatured bacterial antigen combination. With careful selection of cases and close supervision of administration this type of vaccine may produce a specific protection. Further studies are indicated.

SUMMARY

1. In spite of the reports of many investigators there has been no agreement as to whether vaccine therapy is of definite value in the treatment of allergic diseases of children. Some writers claim that autogenous and stock vaccines act in a non-specific way if any favorable response is obtained. Others feel that it is a specific phenomenon. The latter conclusion could be accepted more readily if it was not for the fact that in the preparation of the vaccines the antigenic properties of the bacterial proteins can easily be altered. The undenatured bacterial antigens in vaccine form come closest to being the ideal preparation to employ in protecting against bacterial allergy.

2. From the children attending the allergy clinics of the University and Minneapolis General Hospitals, 214 cases were chosen to represent those who had a definite history of infection associated with their allergic disease—namely, allergic rhinitis or bronchial asthma.

3. These children were not all subjected to vaccine therapy. Fifty-six had their tonsils and adenoids removed and 9 responded favorably. Nineteen had a tonsillectomy and adenoidectomy with maxillary sinus punctures and irrigations and 4 showed improvement.

4. The children who did not respond to the operative procedures were skin tested along with those who had had no surgical treatment, and 142 gave positive reactions to foods, inhalants or pollens which were found to be of clinical significance. Once these patients were under control, the infections played a minor role.

5. There remained 59 children who were not improved. They received the cutaneous tests with bacterial proteins and the results were not consistent. Nevertheless, vaccine therapy was instituted and continued until a definite conclusion could be drawn concerning the value of each form of treatment. The response to the autogenous vaccines was poor, to the stock vaccines fair, and to the undenatured bacterial vaccines fairly good.

6. The study reveals that operative procedures do not relieve many children who have infections associated with their allergy, that a good method of skin testing with proper interpretation is of great value, and that vaccine therapy is of little help except in those cases receiving undenatured bacterial antigens. This statement, however, may be disputed by physicians who emphasize care in the preparation of their vaccines. They claim to have had some good results with autogenous products.

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SIMPLIFIED HEMOGLOBIN TEST

The copper sulfate method for measuring specific gravities of whole blood, plasma and transudates as developed at the Rockefeller Institute for Medical Research and published about a year ago has the appearance of being very complex at first reading. While this is true, it is nevertheless a simplification over previously employed gravity methods that require precision instruments on stable bases. It is further simplified if a separate plasma gravity determination is not required. And finally the test becomes simple indeed if there is but one question involved: does the specimen of blood under consideration measure up to 80 per cent hemoglobin? This is the standard requirement set up by the American Red Cross Donor Service. Inasmuch as the exact amount above or below this figure does not come within the province of such preliminary investigation, there is need of but one test solution. Other, more searching, blood studies are made on specimens after they arrive at a regional depot laboratory but the hemoglobin determination must be

made before the donor is acceptable as such.

Assuming that the plasma protein is within normal range, one can disregard the other, more complex factors. Using a copper sulfate solution of a specific gravity of 1.052, if the plasma protein level is at the mean normal, the test will check for a hemoglobin content of 12.3 gram and this is equivalent to 80 per cent of hemoglobin. Any error in this method of hemoglobin determination, so far as it affects blood donor selection, will be on the conservative side, since most inaccuracies will consist of too low readings. If a drop of blood is allowed to fall into the solution, it is only necessary to note whether it rises or sinks. The size of the drops does not have to be constant so that no special pipette is necessary. As the drop strikes the surface of the test solution it is encased in a sac of copper-protein and the phenomenon of rise or fall is delayed for fifteen or twenty seconds. If it then sinks to the bottom it may be considered to have a hemoglobin content of 80 per cent or more and be acceptable.

A.E.H.

WAR AND MEDICAL ATTITUDES

The war has produced so much medical and surgical drama that it may well take some time before kept-at-home doctors will be able to take it all in and put it to daily civilian use. New drugs, new operations, new uses of blood, new treatment of wounded nerves, even new diseases, new at least to all but "tropical" doctors, and new attitudes on the part of many in the profession toward public health, industry, and education.

Certainly it is ironic that the most cataclysmic global destruction of all time should have brought forth more life-saving discoveries and devices than peace could ever deliver in an equal space of time. But already all of this is "old stuff." Today even the man on the street talks glibly of penicillin and the sulfa drugs whose very names he had not heard a year ago. Everybody knows now that only 3 per cent of the men who are wounded die of their wounds, that the health of our war-time army has been better than it was at any time during peace. Never before in so little time has the medical profession made such strides.

But the picture is not all rosy. The war has brought into focus another side, one to give pause to our complacency. For there is another army we cannot disregard, the army of the physically discarded. In a hearing before a senate committee the Surgeon General of our Navy stated that from 40 to 50 per cent of our young men between the ages of eighteen and thirty-seven were found to be physically unfit for general military service. This is a staggering fact to face for a country whose boast is that it is the richest and most vigorous nation in the world. And even more arresting is the statement made at the same hearing by Colonel William Menninger, that "of all the rejections for medical reasons the psychoneurotics have often accounted for as much as 40 per cent during a single month." Add to this number the thousands who are breaking down psychologically under the stress of combat and it looks as if for years to come personality and emotional problems are bound to be of primary importance not only to society at large, in business, industry and family stability, but to physicians everywhere. And how many doctors are prepared to meet this phase of national health?

There are only 3,000 qualified psychiatrists in the United States and that includes all those in military service. Obviously most of the burden must fall on everyday doctors, men who for the most part are only just learning that "the person who lives within the framework of the body" is often the main factor in the disease. The average medical school has had little to say about personality trends and emotional drives. To most doctors the "neuro" has long been his chief bore to be given a placebo and hurried out of the office. But we are going to have to think a lot more about "neuros" after the war.

Postwar medical attitudes and practices are undoubtedly not of the subjects Churchill and Roosevelt discussed during the meeting at Quebec. But they may have more to do with the world's happiness and well-being than the boundaries of Poland! M. U.

CORRECTION! P. 307, September issue: Dr. H. D. Newby is at Rapid City. Dr. Hugo Neucamp of Hosmer (omitted) is deceased.

Book Reviews

The Psychology of Women, by HELENE DEUTSCH, M.D.; New York: Grune & Stratton, 399 pages; 1944. Price \$4.50.

In the preface of her book Dr. Deutsch quotes Freud as saying: "Throughout the ages, the problem of woman has puzzled people of every kind—you, too, will have pondered over this question insofar as you are men. From the women among you that is not to be expected, for you are the riddle yourselves." Perhaps this is why nearly all the many hundreds of books about women have been written by men and why, every season, publishers' lists prove that the "riddle" perennially nags for solution.

Dr. Deutsch is one of the few women to offer the answers. And she is eminently fitted for the task. Associate Psychiatrist of Massachusetts General Hospital and lecturer at Boston Psychoanalytical Institute, for thirty years she has talked and listened to the woes of girls and women, always seeking to find the "feminine core" and following in her interpretations the footsteps of her teacher and master, the great Freud himself. She admits and subscribes to his contention that the degree of objectivity in the female is low indeed, but she justifies her, what is surely an objective study, on the ground of compensatory feminine factors.

She begins with the young girl at prepuberty when the "feminine core" is in the process of formation, to be completed when menstruation is established. She next analyzes this "core" as it operates in adolescence and finds that the three essential traits of femininity are narcissism, passivity and masochism. Thirdly, she considers the apparent non-feminine aspects of femininity as they appear in the aggressive, dominating, "masculine" women and here she finds the core intact under the assumed mask of masculinity.

In the development of these themes Dr. Deutsch displays more than a suggestion of the intellectuality she regards as a masculine attribute, for this is a scholarly, analytical study of which even a male Freudian might well be proud. It contains innumerable interesting and suggestive analyses and some profound psychological interpretations. Her chapters on the eroticism of women, on homosexuality and on the "active" woman merit the most thoughtful reading. The weakness of her argument seems, to this reviewer, to lie in her contention of the static, the immutability of the "feminine core." The "facade may change, but the feminine core remains unchanged throughout all storms" and has remained so through all the ages. But does it? Fifty years ago textbooks in physiology differentiated two types of breathing; masculine or "abdominal," feminine or "costal." But tightly laced corsets became obsolete and with them went "costal" breathing and another secondary sex difference. Is it possible that when society discards all the lacings it has imposed for centuries to inhibit the intellectual and spiritual powers of women the feminine core may prove to contain some germs Dr. Deutsch has missed, even with her brilliantly wielded probe?

You may not agree with the author, your wife is pretty sure not to, but here is an interesting contribution to dynamic psychology, one that may even explain for you the exasperating behavior of some of your difficult women patients.

Virus Diseases in Man, Animal and Plant, by GUSTAV SEIFFERT, translated by MARION LEE TAYLOR, Ph.D. New York: Philosophical Library, Inc. 332 pp. 1944. \$5.

A short and pointed book, surveying and reporting the major research work during the last decade in the important virus field, can hardly fail to merit the close scrutiny of all workers in this branch of medical science. The author, whose qualifications and professional position do not appear on the title page, has wisely not attempted too comprehensive a review in following out the purposes he outlines for his book. There is a short added section on methods. Each virus disease is treated separately, and briefly. It is an interesting summary and a "refresher course" of the present status of virology.

News Items

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Dr. Daniel Blain, director of the War Shipping Administration United Seamen's Service, medical division, who has contributed to these columns, returned recently from an inspection of USS-WSA facilities in the United Kingdom and on the Normandy beachhead. He went to England and thence to Normandy by merchant ship and returned by plane. Dr. Blain spent a week in London before he saw a single child, and he concluded that the children who had not been evacuated were kept indoors. He heard 50 pilotless planes go over London the first night he spent there. He conferred with many American Army and British medical men on medical problems. The privations the British are enduring with dogged courage enlisted his sympathy.

Dr. Robert Watson of Royalton, Minnesota, has been appointed resident physician at Miller hospital in St. Paul. He has completed his intern work and received his M.D. degree at the University of Minnesota.

Optical repair unit trucks have been devised to provide repair and replacement facilities for spectacles in overseas theatres. These units are mounted on 2½ ton trucks and keep up with advance forces. Each unit is staffed by one officer and six enlisted men, opticians all. It can turn out between eighty and one hundred spectacles daily.

A separate prisoner-of-war hospital, staffed with doctors and medical corps men of the prisoners' nationality, has been established by the medical department at Okmulgee, Oklahoma. American army doctors are the chiefs of the medical services to which eight German physicians have been assigned.

Colonel Edward J. Tracy, M.C., a member of the College of Surgeons from Rosemount, Minnesota, one time resident of Washington, D.C., has been awarded the Legion of Merit for services as surgeon in the Eighth Bomber Command from August 11, 1942, to January 6, 1944. The medal was awarded primarily for his administrative skill and sound judgment. Col. Tracy was graduated from St. Thomas College, St. Paul, and received his medical degree from the University of Minnesota in 1930.

In the first thirty-six weeks of 1944 the United States has had more cases of infantile paralysis reported than at any comparable time in 28 years. Through September 9 there was a total of 10,959 cases. This is 2,030 more cases reported than for the same period in 1931, when the nation suffered its second worst epidemic. The records of the worst outbreak in 1916 show there were 6,769 cases by August 1.

The first shipment of whole blood from the United States to soldiers wounded in France was made by army plane on August 21. The blood is prepared for shipment the day it is drawn and is available for transfusion in France twenty-one hours after it leaves the United States. New developments in the preservation and refrigeration of whole blood make the plan feasible.

The electron microscope, now used in increasingly diversified fields of scientific research, is employed to help speed up mass production of penicillin. The scientific virtue of this microscope is its inanimate ability to "see" beyond the range of light waves. The device's high speed electron waves, while too short to be visible to the human eye, cause micro-organisms and other tiny particles to produce images on a fluorescent screen. These images are visible and can be photographed. Optical lens microscopes magnify objects about 2,000 times or 3,000 times if ultraviolet light is used. The electron microscope makes direct magnifications of 10,000 to 30,000 diameters. By use of photomicrographs, magnifications up to 100,000 and even 200,000 times life size are possible.

The Army Air Forces medical corps has pressed into service a new "flying jeep" type of airplane to rush wounded soldiers from the French front to hospitals removed from the scene of battle. More than 7,000 casualties were evacuated by air during the first three weeks of the Normandy invasion. The flying jeep is used to snatch wounded men from under the muzzles of the enemy's guns and speed them on the first leg of their aerial journey to hospitals. A total of several hundred flight surgeons, flight nurses and enlisted technicians is assigned to this duty.

In the wars of the last ninety years the mortality rate for wounded soldiers has been reduced from almost 50 per cent (Crimean war) to 3 per cent. In the first World War it was 8 per cent. Twenty-five years ago the death rate from meningitis had been lowered from 80 per cent to 40 per cent. Today in our armed forces it is approximately 5 per cent. In one great military installation there have been reported seventy-six consecutive cases of meningitis without a single death. The disease death rate among American soldiers of World War II is only one twentieth as high as that of World War I.

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Optical repair unit trucks have been devised to provide repair and replacement facilities for spectacles in overseas theatres. These units are mounted on 2½ ton trucks and keep up with advance forces. Each unit is staffed by one officer and six enlisted men, opticians all. It can turn out between eighty and one hundred spectacles daily.

A separate prisoner-of-war hospital, staffed with doctors and medical corps men of the prisoners' nationality, has been established by the medical department at Okmulgee, Oklahoma. American army doctors are the chiefs of the medical services to which eight German physicians have been assigned.

Colonel Edward J. Tracy, M.C., a member of the College of Surgeons from Rosemount, Minnesota, one time resident of Washington, D.C., has been awarded the Legion of Merit for services as surgeon in the Eighth Bomber Command from August 11, 1942, to January 6, 1944. The medal was awarded primarily for his administrative skill and sound judgment. Col. Tracy was graduated from St. Thomas College, St. Paul, and received his medical degree from the University of Minnesota in 1930.

In the first thirty-six weeks of 1944 the United States has had more cases of infantile paralysis reported than at any comparable time in 28 years. Through September 9 there was a total of 10,959 cases. This is 2,030 more cases reported than for the same period in 1931, when the nation suffered its second worst epidemic. The records of the worst outbreak in 1916 show there were 6,769 cases by August 1.

The first shipment of whole blood from the United States to soldiers wounded in France was made by army plane on August 21. The blood is prepared for shipment the day it is drawn and is available for transfusion in France twenty-one hours after it leaves the United States. New developments in the preservation and refrigeration of whole blood make the plan feasible.

The electron microscope, now used in increasingly diversified fields of scientific research, is employed to help speed up mass production of penicillin. The scientific virtue of this microscope is its inanimate ability to "see" beyond the range of light waves. The device's high speed electron waves, while too short to be visible to the human eye, cause micro-organisms and other tiny particles to produce images on a fluorescent screen. These images are visible and can be photographed. Optical lens microscopes magnify objects about 2,000 times or 3,000 times if ultraviolet light is used. The electron microscope makes direct magnifications of 10,000 to 30,000 diameters. By use of photomicrographs, magnifications up to 100,000 and even 200,000 times life size are possible.

The Army Air Forces medical corps has pressed into service a new "flying jeep" type of airplane to rush wounded soldiers from the French front to hospitals removed from the scene of battle. More than 7,000 casualties were evacuated by air during the first three weeks of the Normandy invasion. The flying jeep is used to snatch wounded men from under the muzzles of the enemy's guns and speed them on the first leg of their aerial journey to hospitals. A total of several hundred flight surgeons, flight nurses and enlisted technicians is assigned to this duty.

In the wars of the last ninety years the mortality rate for wounded soldiers has been reduced from almost 50 per cent (Crimean war) to 3 per cent. In the first World War it was 8 per cent. Twenty-five years ago the death rate from meningitis had been lowered from 80 per cent to 40 per cent. Today in our armed forces it is approximately 5 per cent. In one great military installation there have been reported seventy-six consecutive cases of meningitis without a single death. The disease death rate among American soldiers of World War II is only one twentieth as high as that of World War I.

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Necrology

Dr. Saml. Wallis, 75, Armour, South Dakota, died suddenly August 30, at his home. Dr. Wallace was county coroner and the only physician left in South Dakota's Douglas county. He was a 1900 graduate of Boston College of Physicians and Surgeons.

Dr. William Scott King, 62, formerly of Eveleth, Minnesota, recently of Minneapolis, died in Minneapolis, August 10. He had practiced medicine for more than thirty years.

Dr. Philip G. Cowing, 72, the only physician in Evansville, Douglas county, Minnesota, died August 21, in Fergus Falls of a heart condition.

Dr. Olaf H. Rystad, 68, Grand Forks, North Dakota, died August 17 at Lake Plantaganet, Minnesota. Born in Norway, Dr. Rystad studied medicine at the Chicago College of Medicine.

Dr. G. Willis Bass, 86, Minneapolis, died September 14 in Minneapolis. He was the oldest practicing physician in Hennepin county, the medical society of which he served as secretary from 1889 to 1892 and as vice president from 1892 to 1893, remaining an active member until his death. Two years ago he was honored with a membership in the society's "50 Club" in recognition of faithful service.

Advertisers' Announcements

SHARP & DOHME ANNOUNCES "CALIGESIC" OINTMENT

A new greaseless, anesthetic and analgesic calamine ointment with specific anti-pruritic action has been released by Sharp & Dohme. "Caligesic" ointment contains calamine, benzocaine, and hexyl-m-cresol and is supplied in 1½ ounce collapsible tubes.

"Caligesic" analgesic calamine ointment is recommended in the symptomatic treatment of certain types of dermatitis, including poison ivy and poison oak dermatitis, summer rash, pruritis ani, pruritis scroti, skin inflammations and irritations, and temporary eruptions of the skin.

The analgesic effect of "Caligesic" ointment quickly controls itching and affords relief over a long period of time. It is a bland ointment and is safe to apply to all skin surfaces of infants as well as adults.

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DR. BARLOW TO NUTRITION RESEARCH

O. W. Barlow, Ph.D., M.D., has been appointed medical and research director of Nutrition Research Laboratories, Chicago, makers of ethical pharmaceutical products. Since 1936, Dr. Barlow has been director of research laboratories for the Winthrop Chemical Company. He received his Ph.D. at the University of Chicago in 1926 and his M.D. degree at Rush medical college in 1935. He has served as associate professor on the faculties of the department of pharmacology of the medical school of Western Reserve University from 1924 to 1936 and of the department of biochemistry of Albany medical college from 1936 to 1944.

DR. RICHARDSON WITH SQUIBB

Dr. Arthur P. Richardson, head of the department of pharmacology of the university of Tennessee, has been appointed head of the division of pharmacology of the Squibb Institute for Medical Research, to become effective on October 1, 1944. Dr. Richardson will replace Dr. H. B. VanDyke, who has accepted the position as head of the department of pharmacology, College of Physicians and Surgeons, Columbia university.

Dr. Richardson is a native of Longmont, Colorado, but obtained his A.B. and M.D. degrees at Stanford university (California) in 1932 and 1937 respectively. While taking his doctoral degree, he was assistant in pharmacological research (1933-36), and then remained at Stanford as instructor in pharmacology (1937-38), and later as assistant professor (1939-41). He spent a year as national research council fellow at Johns Hopkins (1938-39). He then became visiting associate professor at the University of Tennessee medical school, Memphis, Tennessee (1941), where he has since remained as associate professor (1941-43), professor (1943—) and head of the department (1941—).

Dr. Richardson's chief interests have been in the field of chemotherapeutic research, and he has had very extensive experience in studies concerning malaria and other tropical diseases. For the past two years he has been primarily engaged in the study of antimalarial compounds.

NEW UPJOHN DISPLAY FEATURES PHARMACY IN THE WAR

To pay tribute to the pharmacists, the Upjohn company is featuring "Pharmacy in the War" in their new institutional window display.

The large center piece of the display carries a number of official Army and Navy photographs showing pharmacists on duty in various parts of the world, including such areas as Italy, Australia, and Bougainville. Prominence is given to the statement: "From foxholes to base hospitals . . . from jungles to Arctic wastes . . . pharmacists are serving the armed forces."

One large side card carries photographs showing research, production, and packaging processes in the manufacture of pharmaceuticals. The other side card shows some of the new pharmaceutical products that are performing such miracles on the battlefield. One of the cards bears this startling assertion:

"Average consumption of pharmaceuticals of men overseas is two pounds per man per month."

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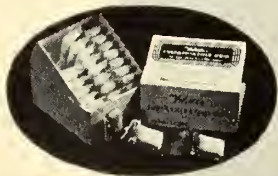
1. Chewing one tablet provides a high salivary concentration (averaging 70 mg. per cent) of dissolved sulfathiazole . . .
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American Student Health Association News-Letter and Digest of Medical News

Dr. R. C. Bull has retired from his position as Director of the Student Health Service at Lehigh University. He is retiring and moving to Delta, Colorado. He plans to take a year of complete rest to recuperate his health. Dr. Bull's new address is 727 Howard Street, Delta, Colorado.

Forty Years of Education. In a recent article entitled "Forty Years of Education" in the July, 1944, issue of the *A.A.A.S. Bulletin* F. R. Moulton presents the following figures:

Elementary and Secondary Public Schools			
	1900	1920	1940
Percentage of school-age population	72	78	85
Average number of days	144	162	175
Average days in attendance	99	121	152
Operations cost per pupil	\$14	\$48	\$92
Cost per capita of population	3	10	18
Average salary of teachers	325	871	1,441
Total expenditure (millions)	215	1,036	2,334

Public and Private Secondary Schools			
	1900	1920	1940
Total Enrollment	696,000	2,496,000	7,113,000
Percentage of population	1.0	2.4	5.4
Total graduated in year	95,000	311,000	1,228,000
Percentage graduated	13.7	12.4	17.2
Men graduated	38,000	124,000	578,000
Women graduated	57,000	188,000	650,000
Percentage men to women	66.6	66.0	88.9

Institutions of Higher Education			
	1900	1920	1940
Total enrollment	238,000	598,000	1,493,000
Teachers colleges	69,600	135,400	177,000
Liberal arts and professional	168,000	463,000	1,316,000
Factor of increase from 1900		2.8	7.9
Increase of population from 1900		1.4	1.7

Treatment of Cerebrospinal Fever with Penicillin. Rosenberg and Arling in the August, 1944, issue of the *U. S. Naval Medical Bulletin* report the recovery of 30 out of 31 patients with cerebrospinal fever, following the use of penicillin. Of the 31 cases, 22 were proved to be meningococcal in origin, 12 were comatose on admission, 11 were semicomatose. The initial spinal fluid cell count varied between 66 and 50,100 per cubic millimeter, the average being 12,300. The majority of cases recovered following only one or two intrathecal injections of penicillin (10,000 to 20,000 Oxford units). Parenteral dosage ranging from 40,000 Oxford units in eight hours to 250,000 Oxford units in forty-eight hours served to sterilize the blood stream in five patients with bacteremia. As little as 20,000 Oxford units given intravenously over a four-hour period, together with one intrathecal injection of 10,000 Oxford units, resulted in recovery in two instances.

A Few "Don'ts" in Shock Therapy. Segal and Aisner (*Annals of Internal Med.*, Feb., 1944) list the following "don'ts" in the treatment of shock:

- (1) Don't use digitalis since it is not the heart but the peripheral circulation which is at fault.
- (2) Don't administer epinephrine. Epinephrine has been used experimentally to induce shock.
- (3) Don't use caffeine and strychnine, they have no value and make the patient restless.
- (4) Don't use chemotherapeutic agents until the urinary output exceeds 700 cc.; otherwise toxic levels of the drug are to be expected.



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The JOURNAL LANCET

Minneapolis, Minnesota
November, 1944

Vol. LXIV, No. 11
New Series

Middle Ear Disease in Children*

Lawrence R. Boies, M.D.†
Minneapolis, Minnesota

THE most fruitful efforts in the prevention or cure of disability in aural function are realized in the management of middle ear disease in children. The past decade has witnessed improvements in our knowledge of the three common middle ear conditions; acute suppurative otitis media and mastoiditis, chronic suppurative otitis media, and the middle ear changes from an obstructed Eustachian tube causing early and potentially serious hearing loss.

A considerable proportion of the cases of middle ear disease in children are cared for by the pediatrician or the family doctor. The latter usually assumes the entire responsibility for this in rural communities where the services of the specialist consultant are not readily accessible. Any physician who assumes this responsibility of treatment of middle ear disease should be cognizant of the newer knowledge concerning these conditions.

ACUTE OTITIS MEDIA AND MASTOIDITIS

A majority of the physicians who treat ear disease have noted a considerable decrease in their experience with acute otitis media and mastoiditis during the past five or six years. Several factors apparently account for this decrease. One is the use of the sulfonamide drugs. Another has been a lack of the epidemics of, or a better control of the diseases which are prominent in the cause of the severe forms of otitis media (scarlet fever, measles, influenza, etc.) Richardson¹ has suggested that there have been fewer acute mastoids operated on because the early mastoid operation, done in the first two weeks of the disease to prevent complications, has been largely abolished;

*Presented at the annual meeting of the North Dakota Academy of Ophthalmology and Otolaryngology, Fargo, May 9, 1944.

†From the Division of Otolaryngology, University of Minnesota Medical School.

thus a greater proportion get well without surgery than used to be the case.

The trend in one locality is shown in Figure 1 where the incidence of acute surgical mastoiditis is charted for the years 1930 to 1943 inclusive on a public ward service and in a private hospital. The number of cases is too small to warrant any significant conclusions.

In my personal experience with the use of the sulfonamides in acute otitis media, I have observed that:

1. It is important to give the drug early and to acquire adequate drainage. This usually means incision of the ear drum if spontaneous drainage has not occurred.
2. If there is no progressive improvement in the condition of the patient in four to six days, the drug should

Incidence of Acute Surgical Mastoiditis²

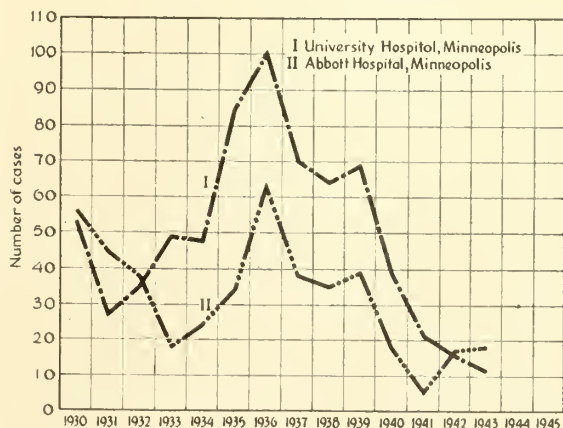


Fig. 1.

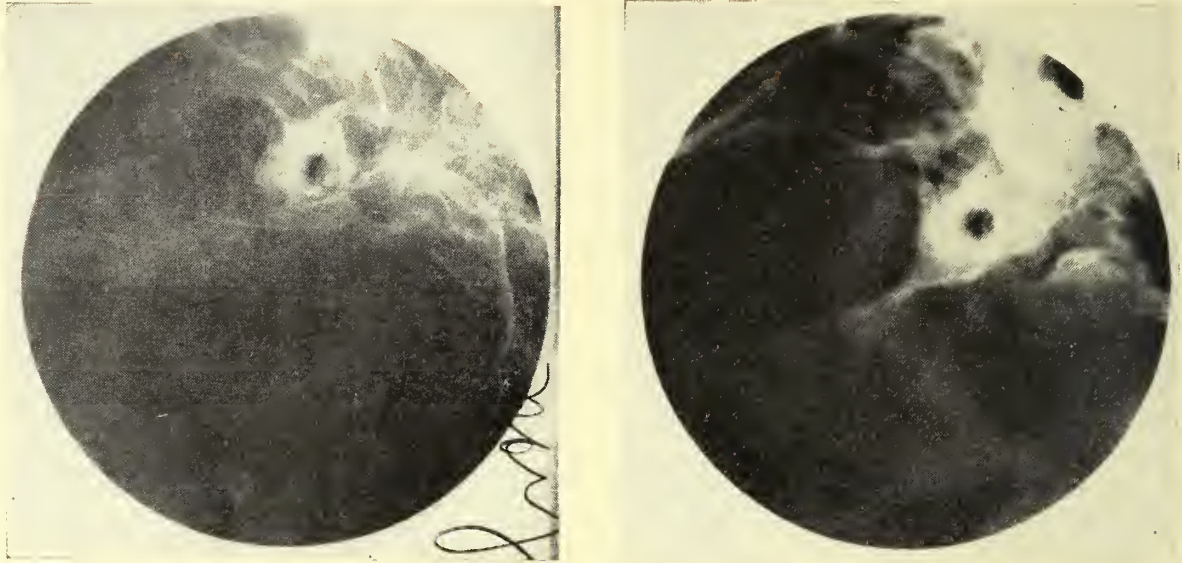


Fig. 2. An x-ray of a normally pneumatized mastoid in a 4-year-old girl.

be discontinued and the course of the infection observed without its being confused by the effects of the drug. This is because the drug is known to arrest the progress of bacterial activity but not to destroy the organism, and a focus of bone inflammation or an actual abscess in a mastoid space is potentially dangerous.

3. When there is progressive improvement in the condition of the patient, it is wise to continue a modified dosage of the drug for several days after the infection seems to have subsided.

The sulfonamides have markedly decreased the hazards of acute otitis media. The mortality from bloodstream invasion approximated 25 per cent a few years ago. (3) During the past four or five years our mortality rate has been under 4.4 per cent. The mortality from meningitis caused by ear infections was practically 100 per cent before the sulfonamides came into use. We can now report a mortality of less than 30 per cent.²

Otologists are in general agreement that in addition to the use of the sulfonamides, adequate treatment of otitic thrombophlebitis or meningitis requires a thorough drainage or exenteration of a suppurating focus.

(Our experience with penicillin during the past few months indicates that we now have an even more potent weapon than the sulfonamides to treat acute middle ear and mastoid disease and its complications.)

CHRONIC SUPPURATIVE OTITIS MEDIA

Chronic infections of the middle ear and mastoid to be properly treated must be considered from the standpoint of the type and the extent of the pathology being treated. This requires an appreciation of the etiology and pathogenesis of the disease.

Chronic suppurative otitis media may occur:

1. As the sequela of a severe infection causing necrotic change in some portion of the tympanum.
2. In an acute otitis media in an ear in which the mucosa has remained hyperplastic.

3. As a result of the formation of a cholesteatoma from an ingrowth of epithelium through Shrapnel's membrane without pre-existing perforation or otitis media. (Uncommon).

4. As a complication of ordinary acute otitis media in an ear with normal pneumatization. (Uncommon).

EXPLANATION:

1. *Necrotic changes in the tympanum* are the result of a severe infection and usually occur as a complication of severe attacks of scarlet fever, measles, influenza, etc. The damage to the middle ear is so severe that a recovery of normal function is unexpected. Either there is healing with more or less scar formation, or the suppuration continues with proliferative soft tissue change and in some cases the ingrowth of squamous epithelium. This ingrowth may result in a retention of epithelium and the formation of cholesteatoma.

2. In the present state of our knowledge, it is now believed that *the middle ear mucosa may remain hyperplastic* if there is interference with the normal expansion of the air sac through the middle ear space into the mastoid antrum after birth. This may be caused by an otitis media neonatorum (the effect of amniotic fluid, etc., in the middle ear space), or a catarrhal otitis media in early infancy.

If the middle ear mucosa remains hyperplastic, pneumatization of the mastoid is abnormal (Fig. 2). *A subsequent infection in the middle ear is destined to chronicity because there is not the normal healing capacity in the middle ear mucosa.*

3. Prolonged negative pressure in the middle ear because of obstruction to normal middle ear ventilation through the Eustachian tube, may retract the flaccid portion of the drum membrane inward so that eventually a constricted invagination of the epithelium occurs. This may result in an isolation of epithelium which develops into a cholesteatoma. It is usually confined to the attic of the middle ear.

4. It is uncommon for an ordinary otitis media in a previously normal middle ear to become chronic, but occasional cases are encountered where factors of low resistance apparently explain an inability to heal an ordinary suppurative process.

A PRACTICAL CLASSIFICATION OF CHRONIC OTITIS MEDIA

The pathogenic basis in a given case figures importantly in the matter of treatment. For practical purposes it is helpful to classify chronic otitis media into one of

four types (Lillie⁴) based on the location of the pathological change:

Type I. There is a thin odorless discharge which comes chiefly from the Eustachian tube. The perforation is usually in the anterior inferior quadrant of the tympanic membrane. Evidence of destructive disease in the middle ear is lacking. The discharge is increased with head colds.

Type II. The disease is confined to the middle ear. The perforation is central—small or large. The middle ear contains mucopurulent secretion—granulations or polyps may be present. The ossicles may have been destroyed. There is no evidence of active disease in the attic.

Type III. There is disease in the attic. It may be combined with the conditions described in Types I and II. The perforation is in Shrapnel's membrane or along the posterior margin. Necrotic bone changes adjacent to the perforation are often present. The discharge is foul but often scanty. Cholesteatoma may or may not be present.

Type IV. All cases in which there are signs of extension of the disease to the labyrinth, lateral sinus, meninges, facial nerve, or brain, or in which there is definite evidence of cholesteatoma.

Types III and IV are not as common in children as in older age groups.

TREATMENT

The treatment in Types I and II is conservative. It consists of:

1. The local use of antiseptics and powders.
2. Minor surgical procedures designed principally to remove diseased tissue, proliferative change, and to improve the drainage.
3. Removal of any upper respiratory tract pathology which might contribute to inflammation of the middle ear.

In Type I disease, inasmuch as the Eustachian tube is the chief site of the disease, local treatment to the middle ear is ineffective. The removal of any adjacent upper respiratory tract

infection and avoidance of forcible nose blowing is important. In view of the newer knowledge relative to nasopharyngeal lymphoid tissue, irradiation of the nasopharynx will probably provide an important item of treatment.

In Type II disease, the minor surgical procedures are often applicable. The use of local antiseptics usually consists of the instillation of drops or the insufflation of powders. The use of drops (an alcoholic solution) usually reduces the fetid odor. When the disease is confined to mucous membrane, the continued use of alcoholic drops would probably increase the secretion. The use of powders is very common. Personally, I have not observed any advantage in a sulfonamide over one of the iodine powders or finely divided boric acid. The important factor seems to be the selection of the type of therapy and the care with which it is given.

In Type III disease, adequate drainage is an important consideration. Irrigation of the cholesteatomatous cavity, if present, is next in importance. If these procedures do not produce a satisfactory result, surgery is indicated.

In Type IV disease, surgery is invariably indicated unless adequate drainage provides healing in the cholesteatomatous process.

THE MATTER OF HEARING

In Type I and II, the hearing is usually good. In Type III, if the disease is limited to the attic, the hearing is often excellent. The degree of hearing loss occasionally influences the type of treatment (conservative or radical). In Type IV disease, the hearing is usually of secondary consideration.

EARLY HEARING LOSS IN CHILDHOOD

In the present stage of our knowledge, our greatest opportunity for reducing the disability due to impaired hearing seems to be in the restoration of function of the Eustachian tube in children. Obviously, this depends upon the early recognition and treatment of the type of hearing loss from the cause.

The work of Crowe and Baylor⁵ reported in 1939 and the subsequent reports of these investigators and their associates⁶ have indicated that:

1. There is in children eight to fourteen years of age a high incidence (nearly 40 per cent) of impairment of the thresholds for some or all of the tones above C4; i. e. for frequencies higher than 2048 cycles per second.
2. A common cause of this early loss of high tones is

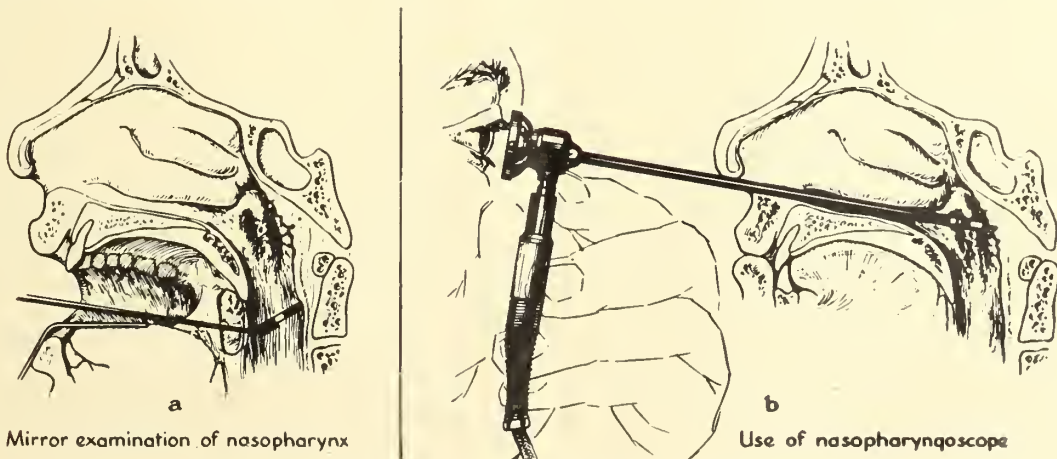
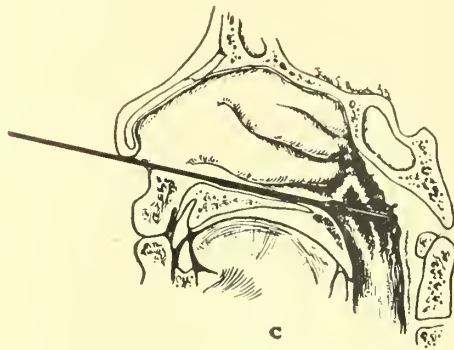


FIG. 3. (A) The mirror can be used in many cases to adequately view the nasopharynx. (B) The nasopharyngoscope is useful when an adequate view of the nasopharynx is not obtained with the mirror.



Radon applicator in position

Fig. 3. (C).
The relative size and position of the radon applicator.

to be found in catarrhal middle ear changes which originate from infected lymphoid tissue in the nasopharynx.

Pathogenesis: "Large adenoid or lymphoid nodules near the nasopharyngeal orifice of the Eustachian tube interfere with normal ventilation of the middle ear. This interference with the normal ventilation results by absorption of some of the contained air, in a middle ear pressure chronically less than atmospheric. The pressure difference itself may cause a slight impairment of hearing as well as retraction of tympanic membrane, but the result is mucosal hyperemia and edema. If the condition persists, mucosal hyperplasia and fibrosis develop. The mucosal changes, together with the exudate and transudate that accumulate in the middle ear interfere with the transmission of sound waves to the inner ear. In contrast to the classical idea of the effect of catarrhal otitis media on hearing, we find that the perception of high tones rather than low tones is usually impaired first."

3. Hyperplasia of lymphoid tissue in the nasopharynx is very common in children. A majority of those who have had tonsils and adenoids removed will when examined be found to have adenoid masses or hyperplasia of the lymphoid tissue in the fossa of Rosenmuller and in the region of the nasopharyngeal orifice of one or of both Eustachian tubes.

4. Irradiation of the nasopharynx with a 2 gram minute dose of radon to each side is an effective method of causing regression of small amounts of this lymphoid tissue. This amount of irradiation has no harmful effect upon the nasopharyngeal structure and the patient experiences no particular local discomfort.

5. It is recognized that children with impairment of hearing for high tones could have lesions other than ones secondary to tubal occlusion by excess lymphoid tissue. Treatment in all cases is advisable, however, if the nasopharynx is not normal in appearance. "Such children should be given the benefit of any doubt in the diagnosis and the nasopharynx should be treated in order to decrease the danger of having a progressive conductive lesion superimposed on the cochlear lesion, if there proves to be one. In many cases the diagnosis can be established only by a therapeutic test."

6. Three per cent of the children tested had impaired hearing for all tones or difficulty in understanding the spoken voice. "As a group these children derived the most immediate benefit from radon therapy. Many of them have had improvements of from 15 to 30 decibels

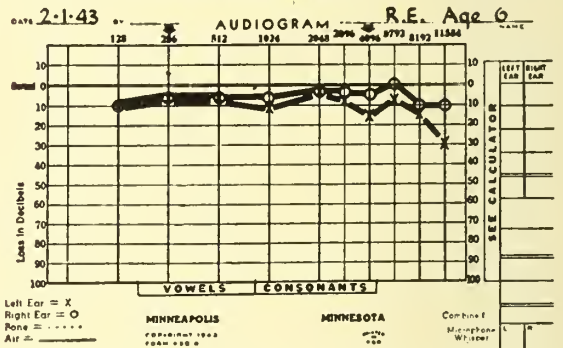
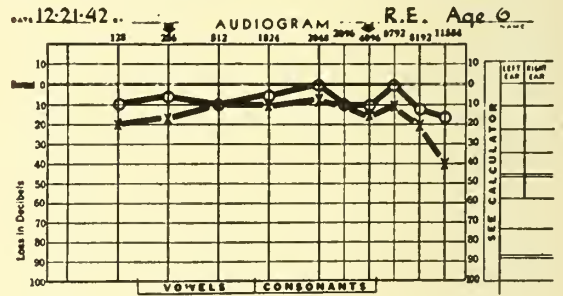
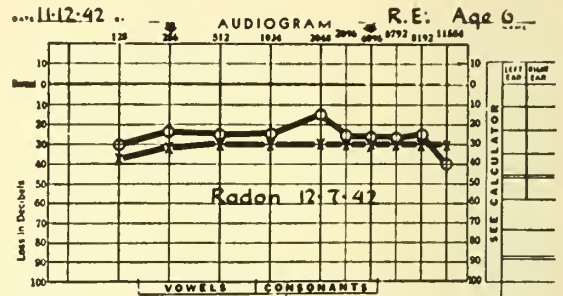


Fig. 4. Audiograms on R. E., age six. Impaired hearing noticed by mother—duration several weeks. Has been using nose drops because of the nasal congestion. First audiogram on 11-12-42. Ear drums lustreless and retracted; nasopharyngitis associated with some lymphoid hypertrophy in the lateral pharynx. Re-checked one week later—no improvement. Radon therapy on 12-7-42. Considerable hearing improvement by 12-21-42. Re-checked on 2-1-43; ear drums still lustreless but less retraction. Nasopharyngitis had cleared.

for all except the very highest tones. Such improvements restore the hearing to essentially normal for all practical purposes, and from an educational standpoint such children cease to be special problems." 6

7. Periodic rechecks every few months are important.

Others 7 have reported experience with this form of therapy and substantiate the work of Crowe and his associates. Some have used radium in brass filtered capsules so that a higher proportion of the beta rays are used. Radium is more accessible to the average otologist than is radon and a much smaller period of irradiation is used when more beta rays are utilized. Thus only a relatively small amount of radium is required.

Our experience at the University of Minnesota hospitals has been concerned chiefly with children who have had impairment for all tones and some difficulty in understanding the spoken voice. The other type of hearing loss is uncovered only on routine testing of children's ears with the pure tone audiometer. Crowe urges that

public programs to find these children should not be operated until provision is made for caring for them once they are found.

The cases of hearing loss treated with irradiation of the nasopharynx have been referred from private practice or have come to the out-patient clinic at the University Hospital because of difficulty in hearing. To date we have treated more than 100 patients. The administration of this treatment has been based on evidence of hearing loss, combined with the presence of adenoid or lymphoid tissue adjacent to the tubal orifices as seen in a mirror view of the nasopharynx (Fig. 3-A) or through the nasopharyngoscope (Fig. 3-B).

The applicators used were passed through the nasal fossae (Fig. 3-C) after preliminary anesthesia with a weak solution of cocaine (4 per cent). No patient complained of any uncomfortable after effects except one child of thirteen years who had a temporary earache on one side.

The results have convinced us that irradiation of the nasopharynx is a simple and effective method of controlling lymphoid hyperplasia adjacent to the pharyngeal orifices of the Eustachian tubes; that this treatment can in many instances restore and control hearing impairment in children when it is due to the middle ear changes resulting from obstructed Eustachian tubes. (Fig. 4).

Otologists seem to be generally in agreement as to the role of nasopharyngeal lymphoid tissue in the development of this type of Eustachian tube and middle ear pathology. Some believe, however, that the lymphoid tissue can be adequately removed by surgery. Surgical removal of a central mass of adenoid tissue is effective. An adequate removal of the lymphoid tissue of Rosenmuller's fossa seems practically impossible without undue risk of hemorrhage scarring with its subsequent adhesion formation, etc.

Roentgen therapy would undoubtedly be as effective as radium. The advantage of the radium is the fact that it can be accurately placed for a localized action. Roentgen rays have to be passed through considerable extra tissue to reach the pharyngeal opening of the Eustachian tube and Rosenmuller's fossa.

SUMMARY

1. Acute otitis media is being controlled in a considerable degree through the use of sulfonamides. The best results are obtained when the drug is administered promptly at the onset of the middle ear infection, combined with drainage of the middle ear.

The incidence of otitis media has been reduced as a result of the use of the sulfonamides in some of the diseases of which otitis media is a complication.

(An experience with penicillin during the past few months indicates that we now have an even more potent weapon than the sulfonamides to treat acute middle ear and mastoid disease and its complications).

2. The intelligent management of chronic suppurative otitis media requires an appreciation of the pathogenesis of this disease. Selection of treatment is based on a useful classification which is determined by the type and location of the pathological process.

3. Hyperemia and edema of middle ear mucosa is commonly caused by obstruction of the Eustachian tube. This obstruction develops from hyperplasia of adenoid or lymphoid tissue adjacent to the pharyngeal orifices of the tube. These changes are common cause of hearing loss in children. This loss can be restored and controlled in many instances by irradiation of the lymphoid hyperplasia. The treatment is simple and without harmful effects.

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Medication in Common Eye Diseases

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THERE are numerous everyday eye conditions and diseases seen by the family doctor in general practice. Many of these can be relieved by the proper use of well-known drugs. It is the purpose of this paper to discuss some of these common disease entities and mention some of the drugs used in their treatment. As physicians we all know that all patients do not respond exactly alike to some internal or external (local) drug given. So we bear this in mind when treating eye entities.

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In this discussion we will view the eye from a symptomatic basis instead of the orthodox textbook manner. The most common type of eye complaint seen by the general practitioner is that of "red" eyes. This may be of minor or major importance. Redness of the eyes may result from (1) inflammation of the skin of the eyelids, (2) redness of the lid margins, or (3) hyperemia of the bulbar conjunctiva or of the sclera or both. In Gradle's classification there are four types of congestion of that part of the eyeball which can be seen between the opened lids.

Type I. A purely local inflammation of the conjunctiva alone where the color varies from a light pink to a fiery red and may involve a circumscribed portion or the entire bulbar conjunctiva. There is always an accompanying similar congestion of the conjunctiva lining the lids. Secretion of some sort is always present. The dilated conjunctival vessels are clearly visible.

Type II. Superficial injection of the conjunctiva attributable to corneal lesions. The color here is less intense, although the conjunctival vessels stand out clearly. It may involve only a quadrant or all of the bulbar conjunctiva. No secretion is present and it is not accompanied by congestion of the conjunctiva of the lids.

Type III. Scleral or deep injection. This is a reaction due to a deeper inflammation, such as scleritis or iritis and is attributable to congestion of the vessels of the sclera. The color varies from pink to a bluish red and is never a fiery red as in that of conjunctivitis. The area nearest the corneal limbus is most intensely involved and toward the periphery the color fades out. The overlying conjunctiva is usually slightly hyperemic, but is not thickened and is freely movable. On instilling 1:1000 epinephrine solution, the color will *not* blanch out as in the case of conjunctival injection.

Type IV. Deep injection of chronically increased intraocular pressure. Primarily, this is found in uncompensated glaucoma and in absolute glaucoma. Here the engorged and tortuous vessels of the sclera can be seen under a freely movable overlying conjunctiva and from these vessels the sclera receives a deep fiery red hue. Palpation immediately reveals an increased tension and the cause.

The general practitioner must necessarily differentiate these forms of injection for such recognition gives one a clue to the character of the disease present and the treatment to be prescribed. The following table gives the differential diagnosis of three important conditions in which red eyes are present:

TABLE 1

	Type I	Type III	Type IV
Symptoms	Acute Conjunctivitis	Acute Iritis	Acute Glaucoma
Pain	None	Slight	Great
Photophobia	Moderate	Slight	None
Tearing	Great	None	Moderate
Secretion	Some	None	Some or None
Scleral Injection	None	Some	Some
Cornea	Normal	Normal	Steamy
Anterior Chamber	Normal	Cloudy	Shallow
Iris	Normal	Muddy	Normal
Pupil	Normal	Contracted	Dilated
Vision	Normal	Slightly Reduced	Marked Reduction
Tension	Normal	Reduced	Increased

After determining that we have a type I congestion of the eye, or an acute conjunctivitis, we should first examine the eye carefully for any foreign bodies being

present. Oftentimes, the patient is unaware of a foreign body present in the conjunctival sac, on the palpebral conjunctiva or on the cornea. Foreign bodies are best removed under local anesthesia of one-half per cent pontocaine, 2 per cent butyn or 5 per cent cocaine with a blunt spud. The eye should then be irrigated with saturated solution of boric acid and ophthalmic White's ointment (1:3000 mercuric bichloride) instilled. If the foreign body is metallic, of iron or steel, and present in the cornea, a ring of stain may remain in the cornea after removal. This may be easily removed by using small dental drills as curettes, rotating them in the depression of the cornea where the foreign body was removed. Atropine 1 per cent is always instilled following the foreign body removal from the cornea, and the eye padded for twenty-four to forty-eight hours.

Sometimes a greyish haze about the area of the removed foreign body of the cornea indicates a beginning corneal ulcer. The extent of the injury due to abrasion, ulceration or foreign body injury may be determined by dropping 1 per cent fluorescein in the eye and washing out this dye with boric acid solution. The injured cells or area take on a bright green color of the dye. If a corneal ulcer is present, type II congestion of the conjunctiva mentioned above will be present. Corneal ulcers following foreign body removal usually heal readily without scarring. However, if corneal ulcer persists, more energetic treatment must be given.

Corneal ulcer that persists is always infected, and we like to treat these cases in the hospital. The local treatment of the ulcer by sulfanilamide or sulfathiazole powder directly to the ulcer area only may be tried. Caution by tincture of iodine, trichloroacetic acid or thermophore to the ulcer area also may be used. Atropine solution 1 per cent, drops two in the eye two or three times a day, prevents iritis and complications. Hot boric compresses or external heat to the eye is advantageous. The general treatment is that of so-called protein shock therapy given intravenously or intramuscularly every other day. This is alternated with large doses of salicylates—120 grains of sodium salicylate in oil by rectum every other day. If the ulcer progresses and perforation is imminent, paracentesis of the anterior chamber is indicated.

In type I congestion, or acute conjunctivitis with moderate reaction and small amount of secretion, one of the following collyria may be used:

R:	Boric acid	gr. 40
	Distilled water	oz. 4
R:	Sodium bicarbonate	gr. 10
	Sodium borate	gr. 10
	Camphor water	minims 10
	Distilled water	oz. 4
R:	Zinc sulphate	gr. 4
	Boric acid saturated solution	oz. 4

If the secretion is more mucopurulent or purulent in character, smears should be taken if possible by the general practitioner to rule out acute conjunctivitis caused by gonococcus (gonorrhoeal ophthalmitis). If the smears are negative, any of the following more pronounced antiseptic collyria may be used:

R̄: 1:5000 Aqueous Metaphen.	
R̄: Mercuric chloride	gr. ½
Boric acid	gr. 40
Distilled water	oz. 8
R̄: Mercuric Oxycyanide	gr. 1
Boric acid	gr. 40
Distilled water	oz. 8
R̄: Ophthalmic sulfathiazole 5% ointment.	
R̄: Sulfa-opto (Abbott). (5% sulfathiazole non-irritating solution).	

If the smears are found to be positive for the gonococcus, hospitalization is required. General treatment with sulfa-drugs is indicated besides local irrigation of the eye. In some cases where the gonococcus is sulfa-resistant, penicillin is of great advantage. One hundred thousand units given intravenously in two days will rapidly clear up the condition. Ice cold boric compresses relieve the swelling, and are of comfort to the patient.

Another type of intense type I congestion of the eyes is that of actinic conjunctivitis resulting from exposure to ultraviolet rays, such as a welder's arc, intense sun rays, or so-called flash burns of an electrical apparatus. This type of inflammation of the eye is not experienced until eight to twelve hours after exposure, a so-called latent period following exposure where the eyes seem entirely normal. The following treatment, which has recently been written up by Scobee and Griffey, we have used with success.

The patient is made comfortable by the use of one-half per cent pontocaine anesthesia followed by 1:1000 adrenalin dropped into the eyes at five-minute intervals for three to four times. The patient then uses metycaine ointment or holocaine with epinephrine ointment every three hours. This usually is sufficient to clear up these cases. In cases of severe burn a miotic pupil is present, and atropine 1 per cent instilled two or three times will be necessary. Ice-cold boric compresses give considerable comfort.

A very common cause of red eyes is a hemorrhage between the sclera and the conjunctiva. This results from rupture of a conjunctival capillary and may be traumatic in origin. This may be a small area, may be quadrantal or involve the entire anterior part of the eyeball. The conjunctiva is freely movable over the sclera. In time the color fades and is completely absorbed. During the first twenty-four hours cold compresses will tend to prevent spread. After that moist or dry heat will hasten absorption. No local medication is of value.

In type III congestion of the eyeball where the sclera becomes involved we may have a light pinkish injection of the sclera in a single quadrant and this is indicative of episcleritis. This condition is common in adults, is of sudden onset, and usually confined to a limited area in one eye. The inflamed area is slightly swollen and likely to be tender to palpation through the lids. The etiologic factor usually is obscure. However, it may be due to apical abscesses of the teeth.

The local treatment consists of hot boric compresses and drops one of dionin, 3 to 10 per cent solution, once or twice a day. If this doesn't clear up in one to two

weeks, foreign protein injection intramuscularly is indicated.

When real scleritis is present the entire anterior part of the sclera will be injected and will have a deep bluish pink color. The overlying conjunctiva is pale and freely movable. The eye is tender on pressure and movement of the eye is likely to be painful. The tension is *not* altered. The treatment is symptomatic as well as etiological. A general physical examination for foci of infection and careful study must be given each case. If no cause can be found, foreign protein shock therapy is indicated. Hot compresses every three hours should be used. If there is any concomitant indication of iritis also being present, atropine 1 per cent is instilled and the pupil dilated. In the latter stages 3 to 10 per cent dionin once or twice a day, one drop, may be used with benefit. If the condition is due to tuberculosis, it may persist for a long time. For selected cases, roentgen rays may be helpful.

Another type III congestion of the anterior part of the eye which presents a ciliary injection about the cornea is an acute iritis. Ciliary injection is a dilatation of the fine, straight vessels about the margin of the cornea, in contrast to the tortuous conjunctival vessels and the large deep scleral vessels. A ciliary injection always should make the physician suspicious of an acute iritis, or more properly an iridocyclitis, preferably called by Gradle an anterior uveitis. In any case of acute iritis the ciliary body is involved and vice versa.

This condition may affect any individual regardless of age or sex and is usually unilateral. The onset is insidious and the disease becomes fully manifest in twenty-four to forty-eight hours. The chief diagnostic points of differentiation between this and type IV congestion of acute glaucoma are given in Table I above.

It may be difficult in some cases for the general practitioner to differentiate the latter two types of congestion. If one is not sure, inasmuch as the treatment is diametrically opposite, none should be given and the patient should be referred at once to an ophthalmologist for verifying the diagnosis in difficult cases.

We like to treat acute anterior uveitis and also acute glaucoma in the hospital under proper supervision. In acute iritis a complete physical examination and search for foci of infection are done. The local treatment consists of hot compresses, atropine 1 per cent to keep the pupil dilated and prevent adhesions of the iris to the anterior capsule of the lens. Foreign protein therapy, consisting of intravenous typhoid vaccine, is given beginning with 12,000,000 dead bacteria and increasing the dosage. This is given every other day. On alternate days large doses of salicylates by mouth or by rectum are given.

In type IV congestion, or acute glaucoma, ice compresses, eserine one-fourth per cent solution, pilocarpin 1 per cent solution, or one of the miotics are used every two or three hours until the tension is reduced and the pain in the eye relieved. If miotics do not reduce the intraocular pressure, surgery is indicated at once in order to save the patient's vision, as destruction of vision occurs rapidly with increased intraocular pressure.

We often see patients who have cataracts who have suddenly developed acute glaucoma and many times the patient and his family doctor have attributed his trouble to the cataracts alone. They are not immediately seen and vision is lost before anything can be done for them. Senile cataracts produce no eye symptoms, as a rule, except a gradual loss of vision. A patient with senile cataracts who experiences any sudden discomfort or congestion in the eye should have the tension taken of his eyes and if it is elevated, surgery should be performed on the eye at once.

Redness of the eyes also may be due to conditions affecting the eyelids. Some of the common lid condition seen by the general practitioner should be mentioned.

Probably the most frequent localized redness and swelling of an eyelid is that due to a stye or hordeolum. This is an acute infection of one or more of Zeis glands of the margin of the eyelid caused by one or a combination of ordinary pyogenic organisms. When the stye first appears, there is no localized swelling, but the whole lid may be red and edematous. Within forty-eight hours the stye becomes localized and points either at the lid margin or the conjunctival surface of the lid. Hot moist boric acid compresses hasten the localization. A conjunctival antiseptic collyrium should be used during the active infection and for a week following its rupture and drainage. When the stye points toward the lid margin, it will spontaneously rupture and drain. However, when it is located on the conjunctival surface of the lid and points, it may be opened by a small, thin, sharp knife. Any of the collyria mentioned above may be used, or a 1 per cent solution of mercurochrome (aqueous) has been effective.

The next most common cause of localized swelling of a lid is a chalazion. These occur on both upper or lower lids, but have a predilection for the inner surface of the tarsus. They arise from low grade infection of the meibomian glands. Blockage of the lumen of the gland from secretion and firm swelling of the lining epithelial cells result in dilatation of the gland which fills with inflammatory infiltration and produces a lump in the lid. The line of least resistance is along the duct leading from the gland to the conjunctival surface, so the majority of the chalazia lie in the inner surface of the tarsus.

The majority of the chalazia require removal and the method of attack varies as to whether the chalazion lies external to the tarsal plate of the lid or internal to it.

Any local inflammation of the eye or adnexa is a very common cause of swelling of the lids. There is no characteristic appearance of any such swelling, but other credences of the causative inflammation will be present, such as various forms of conjunctivitis, dermatitis, scleritis, anterior uveitis, corneal disease, tenonitis or orbital cellulitis.

Localized dermatitis of the lids may be seen. This condition is distinguished from herpes zoster by the absence of herpetic vesicles, and from the bite of an insect, as the site of the bite is usually seen. In true dermatitis of the skin of the lids the skin will be red and thickened and the patient will complain of itching. There may be some edema of the lids present. A search for the cause of the condition must be made, such as face powder, toilet soap, mascara make-up, or other agents.

The treatment is the non-use of water to the skin and zinc oxide (U.S.P.) ointment or yellow oxide 2 per cent of mercury (ophthalmic) ointment to the lids applied especially at bedtime and left on over night. If the causative agent can be found, the lids will clear up spontaneously in forty-eight hours.

Infective skin lesions of the face which extend onto the lids of the eyes are best treated by one of the following ointments: 2 per cent yellow oxide of mercury, 3 per cent ammoniated mercury, or 5 per cent sulfathiazole ointment.

In the northwest where we still have a number of Indians we should mention trachoma, which seems to have a predilection to this race. This is an infectious conjunctivitis of chronic type. It is characterized by the rough appearance of the conjunctiva of the lids due to papillary hypertrophy of the conjunctiva. In the culdesac diffuse infiltration takes place and follicles arise. The bulbar conjunctiva remains unchanged at first, but later becomes injected and pannus of the cornea develops.

Here, sulfanilamide in our hands has been specific. The dose is 1 gram three or four times daily for a period of ten days to two weeks. This may be supplemented with daily painting of the lids with 1 or 2 per cent silver nitrate. If treatment is begun before a pannus on the cornea has formed, none will ever appear and the older cases where pannus is present in the cornea will often clear and leave no resulting opacity. Recurrences are almost unknown after this treatment.

In speaking of medication in eye diseases, one must mention the two new chemotherapeutic agents recently derived from microbial sources. First of these is tyrothricin which is found to be made up of 15 per cent gramicidin and 85 per cent tyrocidin hydrochloride. The product is now on the market as a 2 per cent solution of tyrothricin (Parke-Davis).

Parker Heath reports success in the use of this drug in pneumococcal conjunctivitis, epidemic keratoconjunctivitis, dendritic keratitis, blepharitis and low-grade dacryocystitis. It is used only as a local external agent. Our experience is limited as to its use and many more cases must be reported before we can evaluate this drug. We recently used tyrothricin in a chronic case of staphylococcus aureus infection in the eye with success after all other methods of treatment had failed. The solution used is from 20 to 30 milligrams per cent.

The other chemotherapeutic agent discovered by Fleming is penicillin. The reports of this drug are very encouraging, and when this drug becomes available in sufficient quantities, I am sure we will revise our treatment as to infections of the eyes, particularly in severe ulcers of the cornea, acute iridocyclitis, choroiditis, endophthalmitis and other conditions similar in nature. This drug may be used intramuscularly, intravenously and locally. As a continuous bath or irrigation, it is used in the strength of 1:2500 sodium penicillin, or it may be used as drops in 1:500 in the eye. There is no doubt that tyrothricin and penicillin will take places in our armamentarium and further reports and experience will evaluate their use in ophthalmology.

SUMMARY

A summary of common entities that cause "red" eyes was made and the recognized treatment given in the hopes that it will serve a useful purpose in the service of the family doctor to his patients.

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Vegetable Foreign Bodies in the Tracheobronchial Tree

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SINCE patients with vegetable foreign bodies in the lung are usually seen first by the family physician, he should be familiar with the signs and symptoms which enable him to arrive at the correct diagnosis. There are three common sources of error:

1. Incomplete history or proper credence not given to the history as obtained from the parents.
2. Too much reliance placed on the roentgenogram. A negative roentgenogram does not rule out a vegetable foreign body, especially if the history and physical findings point to such diagnosis.
3. Misinterpretation of physical findings, especially a wheeze. Coarse, asthmatic rales in a non-allergic child strongly suggest a foreign body in the tracheobronchial tree. Many times the symptoms are out of all proportion to the relatively negative roentgenogram. The cough reflex fatigues readily, and the absence of cough frequently misleads the physician. Fever, likewise, may be absent or very slight.

In every foreign body case in my own series, save one (a woman with a safety pin in her lung for 35 years), a positive history of choking on a foreign body has been obtained from the parents of the child. This fact has caused me to wonder how often this accident occurs when the parents are not present to recognize it. I wonder especially when I read frequent stories in newspapers of children dying from pneumonia of only two or three days' duration. Certainly, some of these cases represent unrecognized foreign bodies.

Vegetable foreign bodies include peanuts, seeds of various types — especially watermelon, Russian peanuts (sunflower seeds), peas, beans, kernels of corn, and vegetable matter (especially raw carrot, potato, etc.). Peanuts are by far the most frequent vegetable foreign body and probably equal in frequency all other types combined. A peanut has long been considered the most serious foreign body, but I have not found this to be true. I have encountered cases of a peanut in the tracheobronchial tree of six weeks' or longer duration in which the only subjective symptom was a wheeze and in which the roentgenograms were entirely negative, but the cases of raw carrots and beans in the tracheobronchial tree that have come under my care have developed signs of respiratory embarrassment very early and required emergency care and treatment. Pieces of carrot become quickly macerated in the bronchial secretions, while beans swell rapidly; however, either one rapidly produces bronchial obstruction.

The age factor is interesting. While this accident can occur at any age, a high percentage of these cases falls within the narrow age limit of 17 to 27 months. Children under four years of age should not be allowed to eat raw vegetables or peanuts. At four years of age

dentition in the child has been well completed, and the chewing habit safely established.

Tracheobronchial foreign bodies usually catch in the larynx, setting up a violent laryngospasm. When the patient is finally able to inspire, he literally gulps for air. The inspiratory force thus created draws the foreign body into the trachea or bronchi. The right main bronchus is the favorite site, because it forms a more direct route from the trachea than does the left bronchus.

The patient with a vegetable foreign body may present an acute fulminating process requiring emergency care, or he may present a relatively symptomless course for a period of days or weeks until serious pathology supervenes. In the acute type a severe traumatic tracheobronchitis develops which produces the so-called "drowned lung"; so much secretion forms that the patient literally drowns in it. Death is inevitable unless bronchoscopy with removal of the foreign body and aspiration of the secretions is done promptly. The dramatic relief provided by this is a deep source of satisfaction to the bronchoscopist.

In the non-acute type the most prominent symptom is a wheeze which should never be ignored in suspected cases. In time emphysema of the affected lung appears followed by atelectasis. This may involve individual bronchopulmonary segments or the entire lung, depending on the size and location of the foreign body. At this stage there is usually some elevation of temperature; the child is restless; and there is some embarrassment of respiration. Cough may be present. *Less than 2 per cent* of all foreign bodies are coughed up spontaneously. If the foreign body is not removed bronchoscopically at this time, lung abscess, bronchiectasis, or even empyema will develop. Let me emphasize that a true pneumonia is never a complication of a foreign body. Bronchoscopy should never be long delayed because of impending complications. Prolonged sojourn in these cases increases the danger of subglottic edema following bronchoscopy which may require tracheotomy.

The roentgenogram is of definite value, but the physician may be misled unless the roentgenogram is interpreted with the full knowledge of the physical findings and history. A "drowned lung" can be recognized in the roentgenogram as can atelectasis. Emphysema may be overlooked unless separate roentgenograms are taken at the beginning and the end of inspiration. With the lung expanded the roentgenogram may appear normal; but with expiration the diaphragm remains depressed, and the mediastinal structures shift to the normal side. Emphysema is easily recognized by percussion, and in my experience a tympanic lung when present invariably indicates the lung in which the foreign body is present, regardless of other findings. Straight lateral roentgenograms are helpful in identifying the individual lobe which is affected. It cannot be emphasized too strongly that a negative

Case 1. Peanut in Left Bronchus—36 Hours' Duration

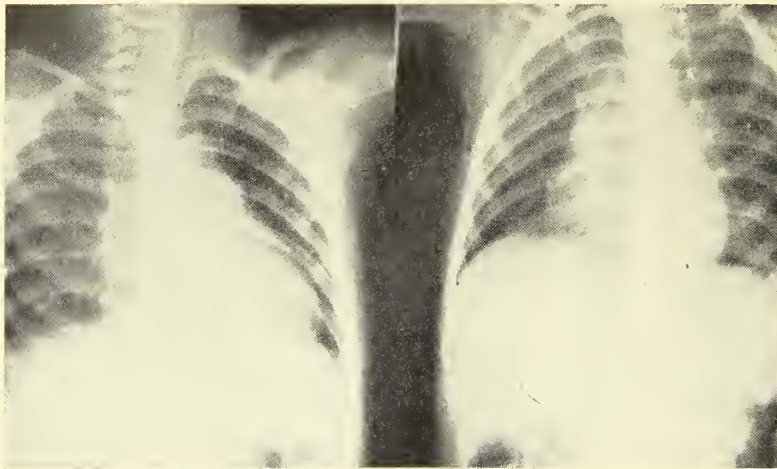


Fig. 1. Left: Peanut in left bronchus—36 hours' duration. Roentgenogram shows an atelectasis of left lung. Right: After-ray, 24 hours later, shows left lung re-expanded and mediastinal structures back in normal position.

Case 3. Peanut in Right Bronchus—3 Weeks' Duration



Fig. 2. Peanut in right bronchus—3 weeks' duration. The roentgenogram shows surprisingly few pathological changes considering the time the peanut had been present.

Case 4. Carrot in Right Bronchus—12 Hours' Duration

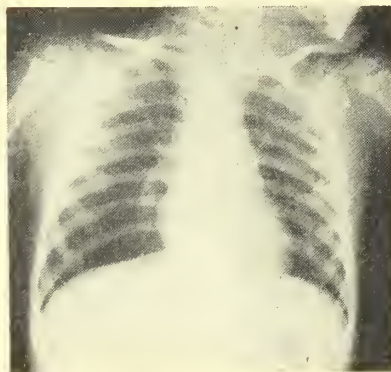


Fig. 3. Raw carrot in right bronchus—12 hours' duration. The roentgenogram shows an early emphysema of the right lung.

roentgenogram does not preclude the possibility of a foreign body. Roentgenograms should always be made prior to bronchoscopy, as the foreign body may not be as suspected. This is illustrated in my own experience in a case in which a piece of doughnut was the suspected foreign body; but the foreign body proved to be a small, open safety-pin in the trachea.

Sedatives, narcotics, and cough mixtures should never be used in these cases, especially if respiratory embarrassment is present, for they increase the possibility of atelectasis. Death is usually due to exhaustion when obstruction is present; any drug that depresses the respiratory center or dries up secretion increases these dangers.

Following this introduction, I wish to present a few selected cases to illustrate some of the points and problems previously mentioned.

Case 1. Baby G. O., age 2½ years, was brought to the hospital in an extreme dyspneic state on April 25, 1936, with a temperature of 104°. The history was that he had aspirated a peanut 36 hours prior to admission. The roentgenogram showed an atelectasis of the left lung with a shift of the mediastinal structures to the affected side. Bronchoscopic removal was carried out immediately with prompt relief. By the following morning his temperature had returned to normal, and the child was sitting up in bed playing with his toys. The after x-ray showed the lung re-expanded and the mediastinal structures in their normal position.

Case 2. Sunflower Seed in Right Bronchus—20 Days' Duration

Case 2. Baby E. H., age 14 months, was admitted to the hospital June 30, 1940, by a local physician who called me in consultation, with a history of choking on a Russian peanut (sunflower seed) 20 days earlier. His home physician had been previously consulted but the diagnosis was not made. The temperature on admission was 103°, and the respirations were very wheezy and labored. A 4 mm. bronchoscope was introduced, and the sunflower seed was quickly removed without difficulty. There was so much congestion that all landmarks were distorted. The following day it was necessary to do a tracheotomy. The baby was given oxygen inhalations for five minutes every half hour; humidity was kept at the saturation point; and frequent suction was employed through the canula. The tracheotomy tube was removed six days later, and the baby was discharged on the fourteenth day. Tracheotomy was necessary in this case because bronchoscopy had been too long postponed; the bronchoscopy was accomplished with a minimum of trauma.

Case 3. Baby M. M., age 4 years, aspirated a peanut on August 10, 1941. The parents consulted their local physician immediately. Because he thought the peanut had not been aspirated, nothing was done until September 2, 1941. The baby's cough became steadily worse, and he developed a wheeze. There was little respiratory difficulty. His temperature on admission was 101°, and his respirations 32 per minute. The peanut was removed from the right bronchus. Part of it was removed by forceps, part by suction, and the rest was coughed out through the bronchoscope. He recovered very quickly and was discharged from the hospital several days later.

The relatively normal roentgenogram in this case and the mild course illustrate how in some cases a peanut is well tolerated by the bronchial mucosa. As indicated, there was some disintegration of the peanut in this case. That is the exception rather than the rule.

Case 4. J. S., age 7 months, aspirated a piece of raw carrot on October 4, 1942. He was admitted to St. Luke's Hospital the following morning. Respirations were extremely wheezy and labored; temperature 102°. Roentgenogram showed an early emphysema of the right lung. Bronchoscopy was done immediately, and the raw carrot removed from the right bronchus. His voice was a little husky for a day or so, but his respiratory difficulty subsided promptly. He returned home on the fourth postoperative day.

Case 5. Baby J. C., age 25 months, was admitted to St. Luke's Hospital January 13, 1944, with a history of choking on a peanut January 1, 1944. Since that time she had had a wheeze and cough. In addition to this she was restless and had run a low grade temperature. Roentgenograms taken on two occasions by the family physician were reported as negative. Roentgenograms taken here on admission disclosed a small area of atelectasis involving the medial basal segment of the right lower lobe. Physical examination revealed coarse asthmatoïd rales involving both lungs, which is the usual finding in these cases. At bronchoscopy one-half piece of peanut was removed from the lower end of the right main bronchus, and a large amount of mucus was aspirated. Her recovery was uneventful so far as the foreign body was concerned. While convalescing she broke out with the red measles, which ran a moderately severe course. In spite of this she developed no respiratory difficulty, and tracheotomy was not necessary.

Case 5. Peanut in Right Main Bronchus—13 Days' Duration



Fig. 4. Peanut in right bronchus—13 days' duration. Left: Roentgenogram shows a small area of atelectasis involving the medial basal segment of the right lower lobe. Right: The after-ray (24 hours later) shows beginning improvement.

Case 6. Baby R. L., age 24 months, was admitted to St. Luke's Hospital February 12, 1944, with a history of choking on a peanut 24 hours previously. There was moderate dyspnea; a marked wheeze was present; and the baby had a temperature of 101°. The diagnosis of a foreign body had been made by the referring physician. Roentgenograms showed a complete atelectasis of the right lung, with elevation of the diaphragm and shifting of the mediastinal structures to the right. Physical examination showed the breath sounds markedly reduced over the entire right lung and many moist rales throughout the left. The natural supposition would be that the peanut was in the right lung, but such was not the case. The right main bronchus was full of mucus which was aspirated. No foreign body was found here. The bronchoscope was then introduced into the left bronchus, where in the distal end, the peanut was located and removed. Recovery was rapid as shown by the after-ray taken 24 hours later. The peanut must have originally lodged in the right bronchus and subsequently coughed up into the trachea and then re-aspirated into the left bronchus. Obviously, emergency care was imperative in this case.

Case 6. Peanut in Left Bronchus—24 Hours' Duration



Fig. 5. Peanut in left bronchus—24 hours' duration. Left: The roentgenogram shows an atelectasis of the right lung and so-called "drowned lung." Right: After-ray 24 hours following removal of peanut and mucus shows normal chest.

Case 7. Baby M. J., age 17 months, was referred to me on August 10, 1943, by a local physician with a history of having choked on a peanut the previous day. She had had two attacks of cyanosis since the accident and was having constant difficulty in breathing. Cough had been pronounced. Roentgenograms showed an atelectasis of the left lung with much secretion present. At bronchoscopy the left main bronchus was completely corked with thick, heavy mucus. This was thoroughly aspirated with immediate relief of respiration, but no peanut was found either in the left or right bronchus. The after-ray shows the lung clearing rapidly, and recovery was uneventful. Apparently, the baby had expelled the peanut by coughing but was unable to rid herself of the mucous plug.

Case 7. Foreign Body Reaction Induced by Peanut



Fig. 6. Left: Atelectasis of left lung and "drowned lung" 15 hours after choking on peanut. Right: Rapid clearing of left lung following aspiration of mucous plug.

Case 8. Watermelon Seed in Right Bronchus—2½ Months' Duration

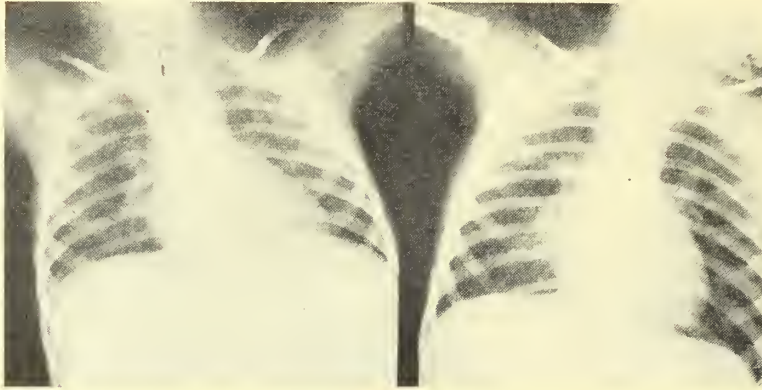


Fig. 7. Left: Watermelon seed in right bronchus for 2½ month shows no pathology recognizable in roentgenogram. Right: After-ray shows normal chest.

Case 9. Peanut in Left Main Bronchus—with Complications Resulting from Tracheotomy

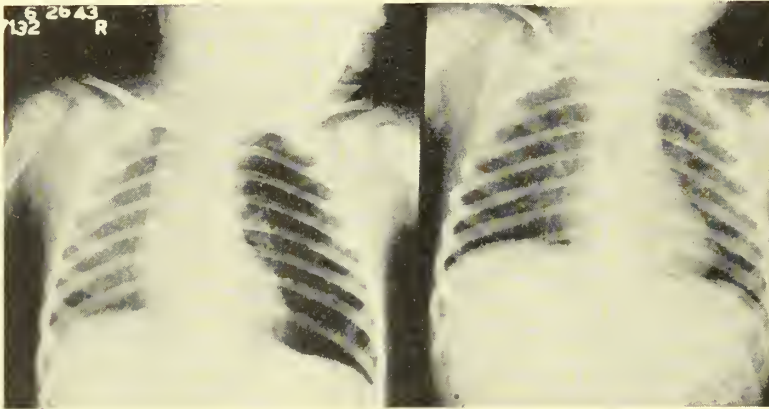


Fig. 8. Left: Emphysema of left lung following aspiration of peanut 11 days previously. Right: After-ray shows normal chest findings. Note tracheotomy tube in place.

Case 10. Kernel of Corn in Right Bronchus—24 Hours' Duration

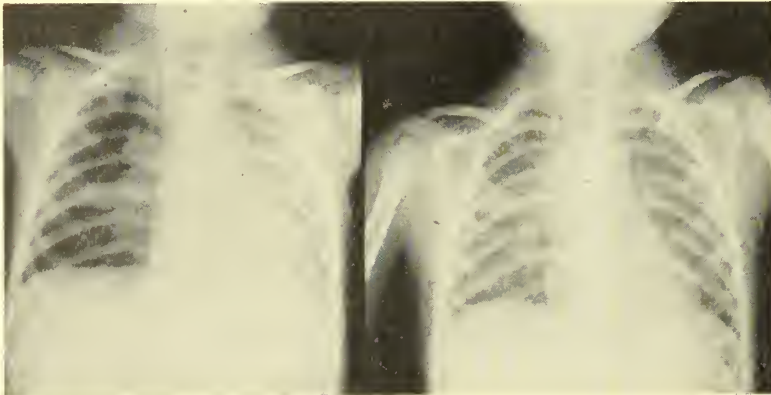


Fig. 9. Left: Atelectasis of left lung with emphysema of the right due to kernel of corn in right bronchus for 24 hours. Right: After-ray on following day shows lungs rapidly returning to normal.

Case 8. Baby R. R., age 25 months, was referred to me by a local physician on December 20, 1943, who suspected a foreign body in the air passages. Two and one-half months previously the baby had fallen down in the barnyard, choking and later vomiting. He recovered from this, but he developed a persistent wheeze and cough. Roentgenograms taken by his home physician were negative as were the ones taken here on admission. This was surprising in view of the physical and bronchoscopic findings. The breath sounds were harsh throughout both lungs, and numerous moist rales were heard. At bronchoscopy the entire tracheobronchial tree contained much muco-pus. When this was aspirated, a foreign body was identified in the lower end of the right main bronchus, which on removal proved to be an intact watermelon seed. Recovery was prompt and uneventful.

Case 9. Baby E. R., age 18 months, was admitted to St. Luke's Hospital on June 26, 1943, with the history of having choked on a peanut eleven days previously. The home physician having been consulted advised observation. The child appeared toxic on admission, breathing was difficult, and temperature was 101°. The left lung was tympanitic, with complete absence of breath sounds. Coarse rales were present over the right base. Roentgenograms showed an emphysema of the left lung. At bronchoscopy the tracheobronchial mucosa was edematous, with thick tenacious mucus present. The peanut was located in the left main bronchus and proved to be very friable. It was removed in several pieces, the whole amounting to three-fourths of a half peanut. Signs of obstruction appeared the following day. A second bronchoscopy was then performed. More mucus was aspirated, but no additional peanut was found. A tracheotomy was decided upon and done immediately. From this time on her course was uneventful except that it was necessary to aspirate mucus through the tracheotomy canula frequently. On July 10, after having had the tracheotomy canula clogged for four days, the canula was removed. She was entirely comfortable until 11 P. M. that night, when signs of obstruction reappeared, apparently caused by prolapse of granulation tissue into the tracheal opening. The canula was re-inserted with some difficulty but with prompt relief. At this time I requested consultation and referred the child to Drs. Holinger and Rigby. I had hoped they would bronchoscope the baby to further rule out any additional foreign body; but they decided this was unnecessary, and the child went on to complete recovery. Dr. Rigby's report is as follows:

"E. R. was admitted to the Children's Memorial Hospital on Friday morning, July 16, and was immediately placed in the humidified room which we have prepared for patients with acute laryngotracheobronchitis, and tracheotomies. Examination at that time revealed a normal exchange of air in both right and left lung fields. She was very comfortable with a normal temperature and did not appear acutely ill. Examination on Saturday and Sunday failed to reveal any changes, and her tem-

perature remained normal. Her white blood count was 5,850 and the rest of the laboratory findings within normal limits. On Monday morning, July 19th, an attempt was made to decannulate this child and upon removal of the tube she was upset for a few seconds and when she realized that she could breathe through her mouth with the tracheotomy opening closed, she continued to breathe without any difficulty and at that time her voice sounded practically normal. The wound was covered with gauze dressings and adhesive tape and the child placed in the humidified room again. Her condition since that time has been satisfactory. An anteroposterior and left lateral of the chest taken Wednesday morning, July 21, showed it to be normal. Auscultation of her chest at this time fails to reveal any abnormal sounds and I am of the opinion that her chest condition has entirely cleared and, therefore, E. is being released today to return to your care."

Case 10. Baby G. A., age 18 months, was referred to me by her family physician with the diagnosis of a kernel of corn in the lung. The kernel had been aspirated the preceding evening. On arrival here May 5, 1944, the child was wheezing and coughing with rapidly increasing difficulty in breathing. Roentgenograms taken by the referring physician earlier in the day were reported as negative. Roentgenograms taken here several hours later show an atelectasis of the left lung which clearly indicates the rapid course of the case. On physical examination moist asthmatoïd rales were heard throughout both lungs. Breath sounds were diminished over the left lung, and the right lung was tympanitic. In spite of the atelectasis in the left lung a diagnosis of foreign body in the right bronchus was made on the basis of the tympanitic percussion note over the right lung. This proved to be correct. The kernel of corn was removed from the right bronchus and a mucous plug from the left. In this case, as in case 6, the foreign body must have lodged in the one bronchus and was later coughed and re-inspired into the opposite side. Recovery was rapid and uneventful as shown by the after-ray taken the following day. Prompt reference of this case was of life-saving importance.

Case 11. Baby H. V., age 3 years, was referred to me on June 30, 1944, by her physician with a diagnosis of a peanut in the tracheobronchial tree of twelve days' standing. Attempt at bronchoscopic removal the previous day had been unsuccessful because of difficulty in exposing the larynx. On arrival here the baby exhibited all the classical signs of laryngeal obstruction and was in a state of exhaustion. Physical examination showed the right lung to be tympanitic, with complete absence of breath sounds over the right base. Roentgenograms showed emphysema of the right lung. Bronchoscopy was out of the question because of the serious condition of the patient. Therefore, tracheotomy was done immediately to restore an adequate airway. An aspirating rubber catheter was introduced into the right main bronchus to remove secretions and with the added hope of dislodging the peanut. This induced a violent cough which forcefully expelled the peanut through the tracheal opening. Recovery was rapid. The tracheal canula was removed three and one-half days later, and the child discharged from the hospital on the seventh day.

Case 12. Baby L. B., age 24 months, was admitted to St. Luke's Hospital on July 12, 1944, with a history of aspirating a peanut five days previously. The baby was not acutely ill but was wheezing slightly with little difficulty in breathing. Temperature was normal. The right lung was tympanitic, breath

Case 11. Peanut in Lung—with Fortunate Removal Through Tracheotomy Wound

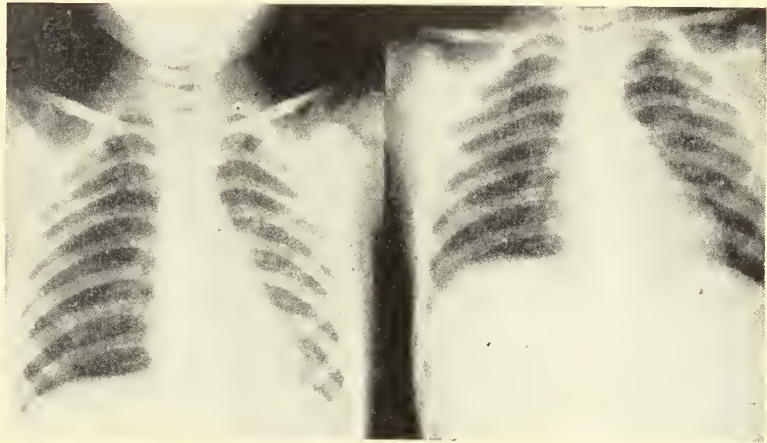


Fig. 10. Left: Emphysema of right lung due to presence of peanut in right bronchus for 12 days. Right: After-ray taken just prior to release from hospital, and after removal of tracheotomy canula shows the chest to be normal.

Case 12. Peanut in Right Bronchus—5 Days' Duration

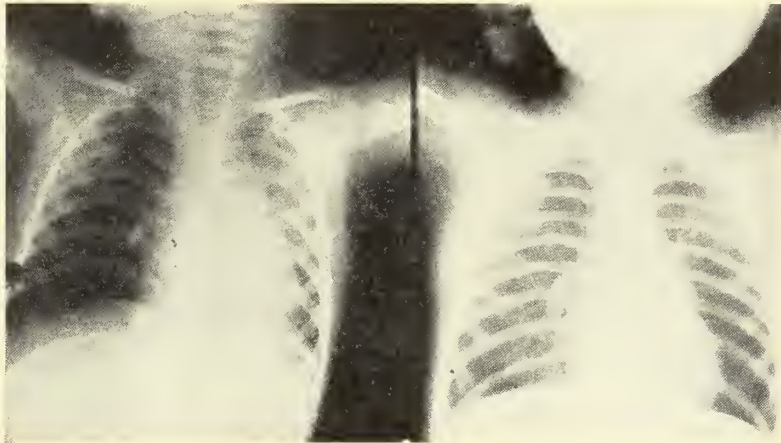


Fig. 11. Left: Emphysema of right lung due to peanut in right bronchus for 5 days. Right: After ray 24 hours later shows a normal chest.

sounds were diminished, and the roentgenogram showed an emphysema of this side. At bronchoscopy the peanut was removed from the lower end of the right main bronchus with prompt relief of all symptoms. There were no subsequent complications. The lack of symptoms in this case is surprising in view of the roentgenological and physical findings.

CONCLUSIONS

Tracheobronchial foreign bodies are not uncommon, and if these facts are kept in mind, serious consequences can be avoided:

1. Early diagnosis and removal of vegetable foreign bodies in the tracheobronchial tree is imperative to prevent serious complications and possible death.
2. Roentgenological examination should always be done in suspected cases. Negative findings do not exclude the possibility of a foreign body.
3. The importance of a wheeze cannot be overemphasized.
4. Asthmatoïd rales, tympanitic percussion note, diminished or absent breath sounds suggest presence of a bronchial foreign body where there has been choking on such an object.
5. Children under four years of age should not be allowed to eat peanuts or similar foods that might become foreign bodies.
6. Sedatives, narcotics, and cough mixtures should never be administered to a patient with a tracheobronchial foreign body.

Management of Strabismus in Children*

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THE problem of strabismus in children leads to questions such as what can be done about it and when should treatment be started. To answer these questions it is useful to have in mind some basic facts concerning the nature and etiology of strabismus and its effects on the child.

In strabismus one eye only or each alternately gets out of proper alinement. The deviating eye may turn in, out, up or down. The age of onset varies from the first year to the early teens. Usually the difficulty appears between the ages of three and six years. The onset may be gradual or abrupt, and the strabismus may manifest intermittently or constantly. Commonly, however, strabismus is fleeting and evanescent, while establishing itself and thus is confusing to the family which is considering consultation.

The two types of strabismus are the paralytic and the nonparalytic; the latter is the more common. The paralytic type of strabismus consists of congenital or acquired muscular or innervation anomalies which prevent the eyes from working in unison. The nonparalytic type has for its etiology anything which can prevent binocular vision. These causes range from a corneal opacity, fundus lesions up through refractive errors, muscle dysfunction and defective fusion sense. The majority of cases of nonparalytic, concomitant strabismus is caused by errors of refraction and defective fusion faculty. Congenital amblyopia, defective central vision in one eye, is also a common cause. Usually a combination of paretic muscular action, refractive errors and defective fusion causes the strabismus.

When a child's eyes are threatened by such a variety of pathologic factors, it is plain that they are in need of treatment. Such treatment should be started as soon as strabismus is noticed. Strabismus is a disease which should be treated in its incipiency. If it is allowed to run its course, unchecked, irreparable damage follows. A few children have transient strabismus or stumbling of the eye muscles in infancy and early childhood, but all of these should be watched and strabismus suspected until the condition is proved innocent.

What are the effects of strabismus on the eyes and the child? When one eye is not fixing properly, diplopia results. To avoid confusion the brain attempts to suppress the false image. In the young, suppression of the false image is easily and quickly done and the younger the child is, the quicker it occurs. In infancy and early childhood suppression of the image from the deviating eye can occur in a few months and such suppression will remain permanent unless treatment is given soon. If the suppressed eye is allowed to become amblyopic, vision will be about 20/100 and the eye cannot read ordinary near print. An eye with such low vision has no incentive to work with the fellow eye and therefore tends to get more out of alinement. The tone and function of the muscles of such an eye become abnormal. Contractures and

atrophy of opposing muscles gradually occur. Fusion sense and higher co-ordination are inhibited. Thus a vicious cycle occurs which ruins the function of one eye and prevents binocular action. This train of events becomes permanent about the age of seven years and treatment must be started before this age. To be sure eyes may be cosmetically straightened by surgery after that age, but vision in the affected eye will remain poor and binocular function will be impossible.

More important, perhaps, than this ocular damage is the effect of being "cross-eyed" on the personality of the child. A child with this affliction is likely either to become a behavior problem or to have an inferiority complex; the latter being the more serious. A child with strabismus tends to become timid and diffident and to shrink from his normal environmental contacts. This tendency, of course, will constitute a real handicap in later life. Such reactions are the child's screen against an unfair and cruel physical handicap.

TREATMENT

Treatment of strabismus divides itself into two periods. The first up until the age of manageability, two or three years of age, and the second from then on. The objective of all treatment is to reverse the pathologic chain of events already described. In infancy and early childhood the chief concern is to combat amblyopia and malfunction of the ocular muscles. Amblyopia is treated by covering or occluding the sound eye, continuously, for several weeks at a time. This forces the use of the affected eye. To be effective occlusion must be continuous. Between periods of occlusion, simple rotation exercises of the eyes are practiced a few minutes each day. These tend to prevent contractures and atrophy of opposing muscles. If these two simple forms of treatment, occlusion and rotation exercises, are carried out properly and faithfully in this early period, the eyes will be well started on the road to recovery. Also in this period the confidence of the child and mother is gained and this is essential for later more complicated treatment.

When the child is three to four years of age, refraction and orthoptic training can be started. Accurate refraction of children's eyes requires the use of cycloplegic drugs, such as atropine, in order to relax the abnormally tense, spastic ciliary muscles. Cycloplegia in strabismus is most important. It permits the accurate refraction of these eyes and the prescription of lenses which balance the vision of the eyes—a fundamental requirement of treatment. Cycloplegia has also a therapeutic effect in relaxing and thus combating spasm of the muscles. The constant wearing of correcting lenses is most important. When vision of the two eyes is balanced, as nearly equal as possible, the images from both eyes are compatible for fusion by the higher brain centers. When the brain is able to fuse the ocular images, strabismus will soon disappear. The object of orthoptic training is to develop compatible images, stimulate the fusion sense and overcome abnormal muscular action. This form of treatment for these children is most efficient when properly and persistently applied. It usually is done by a trained orthoptic technician working with the ophthalmologist who alone has not sufficient time for this treatment.

Nonoperative treatment of strabismus, as described, will result in cure in about 50 per cent of cases. When such treatment fails to bring definite improvement of the eyes within six months to two years, surgical intervention is indicated. Thanks to modern methods of anesthesia and operative technic, surgical procedures can be performed safely and accurately any time after the age of three years. The modern aim for the treatment of strabismus is restoration of function and not mere cosmetic straightening. Proper, early nonoperative treatment combined with adequate surgical treatment when necessary works toward restoration of binocular fusion or real cure.

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Eye and Ear Complications in Acute Infectious Diseases

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THERE is no paucity of literature as concerns the complications to be avoided or coped with in the acute infectious diseases. Yet a perusal of our records on patients for the past thirty-five years shows an almost monotonous recurrence of complications following such infections. So persistent has been the recurrence of these manifestations that it is felt a brief resumé of certain complications peculiar to the more common acute infectious diseases is timely.

Observations are confined to complications of the eye and the ear and intended for the man practicing general medicine who usually treats these cases.

Smallpox: Since vaccination is not yet universal, we have still to combat this disease. It is well to bear in mind that prior to vaccination about 35 per cent of blindness was due to smallpox.

Eye manifestations may be a conjunctivitis, mild, or of a severe "diphtheritic" membranous type. Pustules may occur on the eyelids, the lacrimal passages, or the conjunctiva. These may extend to the cornea. Ulcus serpens of the cornea occurs most often with this disease. Iritis, primary with this disease, is not frequent.

Aural complications often involve the external auditory canal. Otitis media has been observed late in the disease.

Mumps: Eye manifestations: Dacryo-adenitis is the most frequent ocular involvement and follows the parotitis. Frequently there is edema of the lids. Extra-ocular muscle palsies involving the third and sixth nerves occur. Mild conjunctivitis and iritis are not uncommon.

Ear manifestations: Nerve deafness is a more common complication than realized. Its onset coming early in the course, it is painless, and often overlooked unless accompanied with tinnitis and vertigo. The audiometric studies show a frequent history of parotitis in otherwise unexplained nerve deafness. Both ears are involved in about half the cases.

Measles: Eye manifestations: Catarrhal conjunctivitis occurs early—two days before spots are seen on the palate—with redness and swelling of the retrotarsal fold as characteristic. Koplik's spots occur on the conjunctiva. Blepharitis and hordeola are frequent. In severe cases ulcer serpens and keratitis have developed. Paralysis or insufficiency of accommodation is a sequela which may last some time after recovery.

Ear manifestations: Next to scarlet fever, measles is the most common cause of acute otitis media. It is believed a characteristic of this exanthem and not due to a secondary infection. Later in the disease, streptococci and staphylococci find their way into the tympanic cavity. This otitis media often becomes chronic, and in the presence of persistent infection of tonsils, adenoids, and paranasal sinuses it is very frequently so. Next to meningitis,

measles has been found to be the most common cause of deafness from acute infectious diseases.

Scarlet fever: Eye manifestations usually consist of a hyperemia of the conjunctiva that may persist throughout the course of the disease. In some cases a severe "diphtheritic" type may occur, with membrane formation. Corneal ulcers are rare. The retinitis that occurs is usually secondary to the nephritis occurring in scarlet fever. Our records seem to show that in the absence of nephritic involvement, the darkened room and extreme restriction of use of the eyes is unnecessary in scarlet fever.

Ear manifestations seem to vary with the character of the epidemic. If the throat involvement is merely an erythema, the ears are not so frequently affected. When the angina is more intense or of a membranous variety, the ears are almost constantly involved—before the advent of sulfa medication. Scarlet fever is a common cause of acquired deafness.

Influenza: Eye manifestations are varied. Cornea and conjunctiva are most frequently involved. A catarrhal conjunctivitis is common at the onset and usually regresses uneventfully. Dendritic corneal ulcers are frequent and may develop late in the convalescence period. These cause a sharply painful eye; fine corneal opacities may be seen at times. Iridocyclitis has been encountered in one epidemic in 8 per cent of cases.

Ear manifestations, of the type of influenza involving the mucous membranes, frequently cause an otitis media. Usually a variety of organisms are concerned and are believed to spread by extension to the middle ear. The otitis media is usually a virulent type; develops rapidly; and extends to the mastoid unless treated promptly. This type of otitis media is prone to become chronic.

CONCLUSIONS

Ocular complications are frequently part of the disease syndrome of acute infectious diseases and should be looked for and treated promptly.

It is of paramount importance to treat promptly all ear complications of the acute infectious diseases. Frequent otoscopic examinations should be made and appropriate treatment rendered during these infections. It is believed that much of the progressive deafness so manifest these days had its inception in neglected eustachian tube and middle ear inflammation occurring during infancy and childhood.

SUMMARY

Certain eye and ear complications occurring in common acute infectious diseases are presented.

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Eye Changes in Disease of the Thyroid

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THIS clinical survey is obtained from over ten thousand cases of thyroid disease and is the result of nearly fifteen thousand observations. Although the subject matter has been covered a number of times, some new observations were made and the literature reviewed. Certain clinical deductions included in this paper are the results of frequent observations.

It is generally accepted that disease of the thyroid is usually a part of a polyglandular disturbance of which the thyroid is mainly affected. Overaction of the thyroid, toxic thyroid, or hyperthyroidism is the only thyroid disturbance producing exophthalmos of high degree. Colloid goitre and hypothyroidism, except when the basal metabolism is very low, affects to a lesser degree.

Infections of the thyroid, such as tuberculosis, lues, etc., carcinomata, trauma or other changes do not produce diagnostic eye signs. The thyroid patient is often primarily an eye patient and the frequency with which these patients are overlooked warrants a constant watch for thyroid disease whenever the anterior position of the eyes is advanced. Patients who are nervous and high-strung and cannot get used to their glasses are often candidates for toxic goitre. Many patients with muscle instability and head pain are relieved only when their thyroid state is improved. Frequently several glandular substances must be used separately or in combination before any improvement is noticed.

Endocrine disorders (hyperthyroidism, hypothyroidism)—Bilateral exophthalmos in children is not of frequent occurrence, and in my own experience, endocrine disturbances have accounted for most of the cases. These conditions are described fully under the classification of exophthalmos in endocrine diseases in adults, and hence no detailed discussion will be presented here. I shall merely mention that in nervous, irritable children who are not gaining weight, and who show signs of widening of the fissures with slight protrusion of the eye, hyperthyroidism must be considered. On the other hand, those who gain weight easily, are slow in motion and thought, and have heavy eyelids, may well belong in the group with hypothyroidism.

Both these groups of patients present interesting problems to the ophthalmologist, for they display instability of the ocular muscles, for which exercises frequently are ordered which prove of no value. This muscle instability varies from day to day and must be central nuclear in origin rather than peripheral. Some of these children are referred by school authorities for eye examination, especially for the fitting of glasses. The frequency with which they obtain glasses is a good indication of the general lack of knowledge in regard to diseases of this type in children. In our series of patients, both adults and children, with exophthalmos due to thyroid disease, 75 per cent have presented themselves for examination wearing glasses which have been prescribed for them

during the course of the disease. Some of them have received several pairs while the exophthalmos continued to progress.

Protrusion of the eyes may be just as marked and just as serious in children as in adults, and it is important to realize that although some of these children require operations on the thyroid gland, others may be benefited by rest in bed and general measures, including glandular therapy. Great care and judgment must be exercised in the treatment of these conditions, for many of the general symptoms may be transitory. Faulty use of glandular extracts and other therapeutic measures may suffice to precipitate more serious difficulties in these patients. Thyroid extract and the new pituitary products should be prescribed only by those with considerable experience in clinical endocrinology.

Hyperthyroidism—Toxic goitre was first described by Parry, in 1825, and later by Graves who listed three cardinal signs: tremor, tachycardia, and exophthalmos. Since then, other symptoms and signs have been added, such as the increased basal metabolic rate, loss of weight, excessive flushing of the skin, irritability, perspiration of the hands and feet, nervousness that may increase at times to psychosis and dementia. Hyperthyroidism is a serious disease and exophthalmos is one of the serious and difficult problems it presents.

Widening of the palpebral fissures is observed more frequently than exophthalmos and usually precedes the latter by at least a month. Widening of the fissures is not a constant accompaniment of exophthalmos, but when present, may be unequal and unilateral. It is caused by a spasm of the total levator palpebrae, the voluntary muscle and involuntary muscle of Muller. A spasm of the orbicularis oculi sometimes offsets to a slight extent the palpebral widening; this occurs but rarely.

The orbital fissure is usually 9 mm. wide, but measurements as high as 22 mm. have been recorded without proptosis of the eye, and greater widening has been observed in conjunction with exophthalmos. The wide fissures are the eye disorders most commonly seen in photographs of patients with thyroid disease. In this type of case, brilliant surgical results are achieved. The condition is most distressing if not relieved by operation, since it persists to haunt the patient cosmetically by virtue of his friends' lamentations and his own persistent lachrymation.

A unilateral retraction frequently furnishes the reason for the mistaken diagnosis of unilateral exophthalmos, as well as that of unilateral ptosis, whereas the actual picture is usually a normal anterior posterior position with retraction of the lid on one side and with a partially successful attempt of the orbicularis to overcome the levator spasm on the other side.

The widening of the fissures bears no relationship to the severity of the hyperthyroidism and is sometimes seen in neurocirculatory asthenia and in occasional cases of superior rectus paralysis in which the levator attempts to compensate. When the widening is extreme, the eyeball must be protected, as the cornea dries rapidly on exposure. Lid sutures usually are unsuccessful, especially in conjunction with exophthalmos, although it is sometimes possible to bring the lower lid up, using a collodion skin dressing to help support the skin of the face.

Widening of the fissures is not present in all cases of hyperthyroidism, but it is a frequent and early sign and probably accounts for the following accompanying ocular signs and symptoms.

(a) Lid lag is due to poor coordination between the levator and other eye muscles, especially the inferior rectus. A persistent, wide fissure may require operation on the lids, and of the three procedures advised, tarsorrhaphy is preferable. This yields satisfactory results, is not difficult to perform, and does not require hospitalization or complete closing of the eyes.

(b) Photophobia is a secondary feature due to exposure keratitis and total exposure of the entire cornea and pupil to light. The levator spasm does not allow the lids to relax, even in the brightest light. Patients so afflicted should wear tinted lenses outside in the sunlight.

Exophthalmos, originally listed as one of the triad of tremor, tachycardia, and exophthalmos in Graves' disease, is not present in every case of toxic goiter, although it is observed in the majority of cases. It is not present in cases of large colloid goitre unless there is some toxicity present, nor can it be found in patients with thyroiditis, simple adenoma, or carcinoma. When it is present in these types of thyroid disease, there is always evidence of hyperthyroidism. The size of the gland is not indicative of its toxicity, nor is the exophthalmos an indication of the severity of the disease.

Every instance of exophthalmos in hyperthyroidism in my series of cases was bilateral. Using 20 mm. as a high normal value, unilateral proptosis was evident in but three cases and these cases later developed exophthalmos in the fellow eye. The protrusion may be unequal but in only a few instances was there more than 3 mm. difference and in only two cases did the difference in measurements amount to more than 5 mm. The degree of protrusion varies tremendously and may result in anterior luxation of the globe with blindness and may even cause death. However, extensive protrusion is not always the cause of anterior luxation. There is a decided tendency for some eyes to luxate early and it must be attributed to weak anterior fascia and a marked spasm of the levator palpebrae, plus the rapid development of edema. These patients, in whom the condition progresses rapidly to luxation, are usually of advanced age, almost always more than fifty years of age. These cases frequently have an associated severe cardiac condition (myocardial degeneration) or dementia, or both. Luxation as a rule is seen as the end stage, death usually following.

The duration of the exophthalmos before operation prognosticates the amount of recession to be expected after removal of the thyroid. The patient should not be

given promises, however, for in my series, the average recession after operation was only 2 mm. In early cases, the recession is more marked, but in advanced cases, there is little if any return toward normal.

In every case of exophthalmos due to thyroid disease, careful measurements should be recorded, and if the condition is progressive, the patient should be subjected to thyroidectomy. Of the three types of treatment, medical, surgical and irradiation, operation performed early in the course of the disease offers the best results, so far as the exophthalmos is concerned.

Exophthalmos which makes its initial appearance following operations on the thyroid, and exophthalmos which progresses postsurgically are extremely distressing complications, and are caused by several factors. In the first place, the so-called recurring hyperthyroidism may be due to retention of too much glandular tissue, which requires further removal. However, the eyes should be observed carefully, for the condition may be the result of acute hypometabolism with rapid edema simulating the exophthalmos of hyperthyroidism, and in this event, additional removal of thyroid may be fatal to the patient, or at least cause serious damage to the eyes.

Secondly, another group of patients with exophthalmos that develops postoperatively present unquestionably the most devastatingly severe type of protrusion to be found in conjunction with thyroid disease. In the first place, it simulates severe myxedema of the orbit rather than edema due to hyperthyroidism, and hence really represents a different process, which will be discussed under the heading, malignant exophthalmos. In my opinion, this type is evidence of a true polyglandular disease.

Thirdly, there is a group of patients with truly recurrent hyperthyroidism, in whom the exophthalmos halts for a period, recurs and becomes increasingly, though slightly worse after each attack. In my experience, operation offers more for these patients than any other treatment devised to date, although, in some instances, several operations may be required.

There is a corneal dystrophy in association with the exophthalmos of hyperthyroidism that is not found in retraction of the lids nor in any other cases of exophthalmos; it simulates that associated with the postsurgical dystrophy of *tic dolooureux*. The areas are rarely infected and the degeneration of the globe is not due to a primary infection. A low-grade iritis has also been noted in several cases. Evidence in some instances points to a vascular embarrassment, whereas in others, the process seems to be of a neuroparalytic type. These patients with corneal involvement respond immediately to removal of the thyroid, and it is our practice to operate on these patients earlier than in other hyperthyroid patients, in order to relieve the condition in the cornea. Since instituting this procedure, no eyes have been lost, and the ulcers have responded to this treatment with no additional treatment.

Keratitis lag ophthalmitis occurs only in certain individual cases, and many patients with wide protrusion suffer no corneal disturbance.

Lachrymation is a common disturbance in exophthalmos and is due to exposure and stimulation of the lach-

rymal glands. There is frequently an irritative type of conjunctivitis which is relieved by the general treatment and relaxation of the lids following operation.

To correct the failure of the lids to close at night, there is nothing so satisfactory as a well-fitted bullar or cellophane shield. Recently a plastic goggle, made by Watchemoket, has proven entirely satisfactory. Suturing of the lids and similar procedures are treacherous and illogical because the edema can not be pressed out and the posterior pressure is then magnified against the cornea or the sutures. A more rational procedure is to apply vaselined gauze (super-saturated) over the eyes at night, and most efficacious of all is early operation on the thyroid gland.

In conjunction with these cases of exophthalmos, there have been ten instances of transitory glaucoma and one in which glaucoma persisted. The tension reading recorded 90 mm. (Schiotz) in one case and all were fairly high. All these patients were relieved by thyroidectomy except one, who had myopia with glaucoma and exophthalmos and postoperative hypometabolism. This patient required eserine over a period of ten years. Visual field changes were not present in the other nine cases. I believe that increase in intraocular pressure accounted for the severe headache of which these patients complained. In all these instances, the disturbance was bilateral, all were adults, and intraocular surgery was not necessary in any case.

There are no diagnostic visual field changes in toxic hyperthyroidism. In all cases investigated, the fields were normal or the changes observed were merely coincidental. The results of field studies in this group are almost identical with those in a group of normal patients.

Another associated sign of exophthalmos in hyperthyroidism is lid edema, usually of the upper lid. The lower lid is rarely affected except in longstanding cases, and when present is a good indication that the exophthalmos has persisted for considerable time. In patients with edema of the lower lid, there is very little recession of the eyes after operation. The edema of the lid, however, is exactly the same as the orbital edema. This is fluid in the early stages, followed by lymphocytic infiltration (mild in some cases) and later, by fibrosis not unlike the fibrosis of myxedema.

Many of the other ocular signs of thyroid disease are merely secondary and are infrequently observed. However, the group in which there is disturbance of muscular function is quite large. The weakness of accommodation convergence (Moebius) is common in exophthalmic goitre, persists long after operation or medical treatment, and may require special muscle exercises or prisms before the patient is able to work and become rehabilitated economically. Of all the eye signs, this one is the most persistent, and years after the patient "is cured" of the disease, the muscle error may lead him a disagreeable chase from oculist to surgeon to oculist.

Other muscles are similarly involved and isolated muscle paralysis is common. The two muscles most frequently involved are the right superior rectus and the right external rectus. Much of the dysfunction corrects

itself in time and six months to a year should elapse before any operation is undertaken on the ocular muscles. The recovery from thyroid disease is very slow. The disease affects the entire system, and naturally the rebound is not rapid.

Bilateral muscle involvement is more than coincidental. At least six cases of bilateral superior rectus paralysis have been seen and in these instances, as one would expect, the fissures are exceedingly wide. The patients of necessity carry their heads well back and the muscles of the neck suffer spasm and are painful.

The internal recti may be weakened but are rarely paralyzed. The oblique muscles are involved infrequently. However, cases are on record of involvement of the oblique muscles and of the inferior recti. The head tilts in these instances are similar to those noted in the hyperphorias.

Complete external ophthalmoplegia was noted in two patients with exophthalmos, one in whom it was severe, and the other with slight proptosis. Both these patients succumbed before treatment could be instituted. One had definite symptoms and signs of cerebral involvement, and the other was mentally normal the afternoon of his death which was due to cardiac failure.

The pupils, iris, retinae, and nerve heads are diagnostically of no value in hyperthyroidism, and are rarely involved in true toxic goitre. No significant diagnostic sign can be attached to any changes in these parts.

A description of the orbital content made by Moore is typical of our findings in all cases of exophthalmos of short duration. "I therefore made an incision the entire length of the inferior conjunctival fornix, exposed the contents of the orbit, and with forceps picked away piecemeal as much orbital fat as possible. I estimate that a heaped-up teaspoonful was thus removed. . . . In addition, however, the fat seemed edematous, and in particular the inferior, internal and external recti muscles, which were exposed for a considerable distance, and these, instead of being the flat, rubber-like muscles, much as we become familiar with in squint operation, were greatly swollen, fusiform bellies, apparently from edematous infiltration, not quite so stout as the last joint over the little finger."

Cases that emphasize the importance of establishing a diagnosis of exophthalmos are those of the so-called neurocirculatory asthenia. So closely do they simulate thyroid disease in general symptomatology that the eyes are an important aid in the differential diagnosis. The patients show moderately high basal metabolic rates, rapid pulse, tremor and loss of weight. These patients also are extremely apprehensive. Eye study reveals a retraction of the lids due to levator stimulation, and not to true spasm, some lid lag, but no exophthalmos, never any muscle palsies and usually dilated pupils which are rare in thyroid disease. Furthermore, if these patients are placed in bed at complete rest, the basal metabolism rate decreases 20 to 30 points and the heart rate becomes slower. This is the group of patients, often erroneously diagnosed as having hyperthyroidism, that yield some of the most brilliant results in the medical treatment of

"exophthalmos" and poor results when the thyroid is operated upon. These are the patients who, in my opinion are afflicted with the most severe type of proptosis with which we have to deal, namely, "malignant exophthalmos" which develops following thyroidectomy.

Malignant exophthalmos—Cases of malignant exophthalmos and unusual instances of toxic goitre present some of the most serious problems with which the ophthalmologist has to deal in diseases of the glandular system. This group of patients requires special consideration and attention, first, because in the true cases, no exophthalmos existed before operation; secondly, in reviewing the histories of these patients, certain features make one realize that more than the thyroid must be involved, although the clinical picture is largely that of hyperthyroidism. The pulse rate may not be extremely high and the loss in weight may not be great. The basal metabolic rate is inconsistent, and usually is not so high as would be expected in cases in which a great deal of weight has been lost.

After operation, the patient notices a beginning protrusion of the eyes which proceeds unchecked, if no treatment is received. When the patients are seen early, thyroid extract given to the point of tolerance often checks the progress of the ocular changes. They tolerate large quantities of glandular extract, and the medication must be controlled by repeated basal metabolic readings. The edema is that of a severe myxedema, both in the upper and lower lids, and the patients may gain weight. Unless care is exercised, these patients may be judged as having recurrent hyperthyroidism, with the result that a second thyroidectomy is performed. This may result in serious impairment of the general health and may lead to anterior luxation, and even to death.

"Decapping" of the orbit (Nafsiger) is the best approach for the emergency relief of this condition. It corrects the acute situation that general treatment can only improve or check.

The patients with this disease have terrific venous engorgement and may have papilledema; they are extremely uncomfortable on account of headaches. One of our patients had associated increased intracranial pressure which persisted for a long time after operation.

More study and better selection of cases before operations on the thyroid gland will reduce the number of these cases. Nevertheless, it is true that a number of these cases in which this complication developed were studied as carefully as possible preoperatively in the light of existing knowledge of thyroid disease. Scrupulous care exercised at the time of onset of the exophthalmos to prevent additional operations on the thyroid gland in these cases, and adequate treatment with large doses of thyroid extract will reduce the incidence of this type of proptosis still further. These distressing instances probably result from a lack of knowledge of certain phases of thyroid disease and interglandular relationships.

Hypometabolism—Many patients with hypometabolism suffer from severe ocular disturbances. A large number of these patients are not made comfortable by glasses and go from oculist to oculist seeking relief that can

only be supplied through treatment of the general disease. The patients in this group usually are between forty and sixty years of age. They usually present themselves because of headaches and fatigue.

The headache is suboccipital in character, but of ocular origin. It is due to a weakness of accommodation convergence. In an attempt to offset the eye muscle weakness, the patient uses the neck muscles so that pain develops at the site of insertion of the muscles along the superior and inferior nuchal lines on the skull and the sterno-cleido-mastoides at the tip of the mastoid. The head pain appears at about 10 o'clock in the morning, at 3 to 4 o'clock in the afternoon and again after dinner at night. It is usually worse at the end of the week, or after an evening playing bridge, and may be worse in midwinter, because of reading with poor light, etc.

The abduction-adduction ratio may drop down as low as 1 to 1, although 1 to 3 is the usual rate. The rapid muscle fatigue is apparent in other muscles of the body as well, and these patients suffer chronic general fatigue.

Externally, the outstanding feature in cases of hypothyroidism is edema of the upper and lower lids, similar to that seen in long-standing toxic goitre, in postoperative exophthalmos, and in some cases of hypertension. The edema is worse in the morning, but usually persists throughout the day, and can not be reduced by massage or pressure.

The exophthalmos, which may not have been noticed by the patient, may range as high as 25 mm. anterior-posteriorly. This type of exophthalmos may be attributed to marked gain in weight, and is the result of pseudo- or true myxedema. The protrusion is usually bilateral and equal. In my series, the difference between the measurements in the two eyes was not greater than 2 mm. and no instance of unilateral exophthalmos was observed. The protrusion does not retract under treatment and continues to increase slowly unless the patient is undergoing constant treatment with thyroid extract. Usually only small amounts are necessary to keep the metabolic rate at a normal level.

The fissures are normal, rarely wider than 10 to 11 mm. and certainly present no diagnostic signs, although with the eye well forward a lateral inspection may reveal a larger stretch of sclera to the external angle. Ptosis and other lid signs are absent, as are muscle palsies. Itching lids, smarting and burning, with mild photophobia may be present.

Gain in weight and a low metabolic rate, slow pulse, low blood pressure, lassitude, lack of ability to concentrate, and inability to work a whole day comprise symptoms of hypothyroidism. General improvement may not be associated with local improvement in the eyes, and muscle exercises often are of little avail. Prisms to be used in close work are a necessity for accountants and persons who are using their eyes for close, confining work.

SUMMARY

1. Persistently wide fissures should make one suspicious of hyperthyroidism. Neurocirculatory asthenia

must be ruled out by bed rest, rapidly falling basal rate, etc.

2. The exophthalmos is bilateral and, if progressive, surgery is indicated.

3. The duration of the exophthalmos prognosticates the amount of recession later—averages approximately 2 mm. (Hertel's).

4. Muscle errors are common and persistent, may require exercises and surgery.

5. Corneal ulceration is infrequent and is due to exposure and probably some neuro-paralytic factor.

6. Exophthalmos of hypothyroidism is bilateral and has associated therewith edema of the upper and lower lids.

Retinal Vascular Changes and Retinitis in Hypertension

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MANY ophthalmologists, clinicians in internal medicine, and pathologists have studied hypertension since Bright's¹ description of hypertension associated with kidney disease appeared in 1836. Various other ideas of hypertension have been presented, such as Clifford Albutt's² (1896) concept of a vasoconstricting mechanism which leads to arteriolar sclerosis and which is not primarily associated with kidney disease, and Goldblatt's³ experiments (1940) indicating that ischemia of the kidney produces hypertension.

While the medical literature on hypertension shows no uniformity of opinion, an ophthalmologist, a clinician and a pathologist, Wagener, Keith, Kernohan⁴ of the Mayo Clinic, working together, have harmonized their views on hypertension so that a working concept of the condition has been reached.

Fishberg⁵ groups under benign essential hypertension those cases of chronic hypertension which neither clinically nor anatomically can be demonstrated to have evolved from an antecedent inflammatory disease of the kidney or urinary obstruction.

When mild to moderate benign essential hypertension persists for months without remission, the retinal arterioles show narrowing of the lumen and later an increase in the reflex stripe. At first this appearance may be due to tonic contraction of the vessel wall, but soon hypertrophy of the media develops, an attempt of nature to strengthen the arteriolar walls and thus compensate for the rise in blood pressure. Mild compression of the vein at the arteriolar crossing may be present. This change, which could be called fibrosis (arteriolar fibrosis), is usually not observed in emotional hypertension where the blood pressure falls as rapidly as it rises.

Benign essential hypertension may pass through episodes of acute elevations of blood pressure. During these episodes superficial or flame-shaped hemorrhages and fluffy cotton wool exudates with patches of edema appear in the retina and the retinal arterioles show irregular contractures due to spasm. Some observers, notably Clay⁶ in his recent paper on "Ophthalmoscopic Classification of Hypertensive Diseases," believe that these changes indicate kidney damage. Since many of these cases show no

demonstrable clinical or laboratory evidence of kidney involvement, it is more likely that they represent areas of impaired retinal nutrition (anoxemia) due to persistent angiospasm. If these signs are fleeting the prognosis is fairly good. If they persist or increase one can be sure that the hypertension is severe. When edema of the nerve head appears along with an increase in striate hemorrhages and cotton wool exudates, the prognosis is grave. Such patients usually die within eighteen months from cardiac disease, cerebral accidents or terminal nephritis and uremia.

Wagener and Keith have called this severe angiospastic retinitis, the retinitis of malignant hypertension. It may develop without previous signs of hypertension and often in young persons, which leads them to regard it as a special disease entity.

If the angiospastic retinitis passes away, the arterioles show the phenomenon of permanent residual irregularity in calibre with marked increase of reflex stripe in the narrowed areas. Wagener calls these changes post-spastic contractures. Histologically they are characterized by endothelial proliferation superimposed upon the subendothelial hyalin degeneration of the media which is characteristic of arteriolar sclerosis. Enderteritis obliterans may result from repeated episodes of angiospasm.

The ophthalmoscopic differentiation of localized angiospasm from the organic changes of post-spastic contracture or sclerosis is not difficult if the vessel retains its translucency or transparency, if the reflex stripe is not exaggerated and if there is little or no arteriovenous compression.

There are sequelae of arteriolar sclerosis of the retinal vessels which must be recognized and properly evaluated as they have no serious prognostic value except as they indicate the presence of vascular sclerosis in other parts of the body and the possibility of similar sequelae there. These are the deeper lying punctate hemorrhages and small white spots or exudates which lie in the internuclear layer of the retina. Another sequel of arteriosclerosis is thrombosis of the retinal veins varying from involvement of the small macular venules to thrombosis of one or all of the principal retinal veins. These thrombi are characterized by splotchy hemorrhages along the course of the

involved vein, sometimes accompanied by yellowish white exudates.

The macular star figure which is seen in retinitis should also be properly evaluated. Since Bright's time it has been regarded by medical men as the sign of "albuminuric retinitis." It may, however, be seen in the retinitis of malignant hypertension, where no demonstrable kidney involvement is present, in choked disc from brain tumor, and in angioma of the retina. It develops when there has been edema and exudation in the region of the macula from any cause.

In the literature, retinal arteriolar sclerosis has been characterized as having the appearance of copper wire and in later stages the appearance of silver wire. The former would apply to an intermediate stage of sclerosis, while the latter would apply to endarteritis obliterans. Mention is also made of corkscrew vessels in the macular region and increased tortuosity of the retinal arterioles. Neither of these conditions should be relied upon in arriving at an opinion of the condition of the retinal arterioles, for the most marked examples of tortuosity are congenital anomalies and have no relationship to hypertension.

The vascular changes and retinitis which have been described are seen not only in essential hypertension which has grown worse, but also in any hypertension no matter what the etiology. The retinitis of chronic glomerular nephritis is an angiospastic hypertension retinitis. There often are some additional features such as more widespread exudation into the retina with a macular star figure, and anemia with changes associated with anemia of the retina, such as generalized pallor of the fundus and an increased number of superficial hemorrhages and exudates resulting from anoxemia and poor nutrition of the retina. Acute nephritis shows mild acute angiospastic retinitis only when severe hypertension has manifested itself.

In toxemia of pregnancy and pregnancy nephritis, detachment of the lower retina may occur along with the angiospastic retinitis. This is a result of the tremendous exudation into the retina and under the retina. The detachment subsides as the exudate is absorbed.

It is important for the practitioner making fundoscopic examinations to develop the ability to recognize the retinal signs of hypertension, angiospasm, and angiospastic retinitis. He should be able properly to evaluate those changes due to arteriolar sclerosis and its sequelae.

As he becomes more expert he may begin to grade the retinal changes following Wagener's system. This is a refinement chiefly valuable where medical men and ophthalmologists are agreed on the points of differentiation in the various groups or grades. However, any medical man who really looks at the retinal arterioles should be able to learn much about the status of his hypertensive patients. In order really to see these arteriolar changes, one must use an electric ophthalmoscope with a narrow beam of light which does not flood the interior of the eye with light. The small beam of light also often permits one to examine the ocular fundus without the use of mild mydriatics such as 3 per cent ephedrine solution. The routine use of 2 per cent homatropine solution for fundus examinations, especially in presbyopic patients where dilation of the pupil is most needed, is not without some risk of precipitating glaucoma in susceptible eyes. Hypertension changes of the central retinal artery branches are best observed in the secondary, tertiary and quaternary branches. These should be critically examined. Moving the light beam along the vessel wall slowly, changing the direction of the beam now and then as irregularities of calibre are observed. The position of hemorrhages and exudates should be noted as being either superficial in the nerve fibre layer of the retina or deep in the internuclear layer. Other elements of the fundus picture observed should be evaluated as has been described previously and an opinion of the severity of the hypertension can be formed.

SUMMARY

The retinal signs of hypertension, angiospasm and retinitis are described and the pathological changes observed in the retina are correlated with the changes seen in the fundus. Some elementary points in the technic of observing retinal vascular changes are enumerated. It is concluded that any medical man can learn much about his hypertensive patients from ophthalmoscopic observations of the course of the disease.

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Trends in Rhinology*

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THE evolution of nasal treatment as we know it today has taken place largely during the last two decades. For this achievement we are indebted to the present generation of rhinologists. A better under-

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standing of the physiology of the nose and sinuses by these men has paved the way for sound progress in this branch of medicine. This has resulted in more judicious surgery and better directed local treatment. A notable fact is that these contributions have come largely from

the north central states. Deserving of the greatest praise for the excellence of their work are Proetz and Hansel of St. Louis, Hilding of Duluth, Shambaugh, Fabricant and Van Aleya of Chicago.

It has been aptly stated that a well functioning nose may not be a thing of beauty, but it is a joy for ever. Of the two functions of the nose, smell and respiration, we are concerned chiefly with the latter, and the importance of the nose as an air way. As an organ of respiration the nose must prepare the air for entry into lungs. This requires (1) heating of air, (2) humidification, (3) filtration, (4) keeping the filters clean.

The part played by the nasal sinuses in these functions has been shown to be very slight, and the function of the sinuses still remains an unsolved problem. We were taught that the sinuses acted as resonators to the spoken voice, that they added strength and lightness to the bones of the skull, and that they aided in warming and humidifying the air. And who would deny the apparent truth of these assertions? Yet in the light of present knowledge of air currents within the sinuses, and anatomical studies, these theories have been disproved.

The sinuses and nasal chambers are lined by a pseudo-stratified ciliated columnar epithelium lying on a basement membrane and a stroma of varying thickness containing glands. The pre-turbinal and anterior septal areas possess a stratified squamous epithelium, and the olfactory area a further specialized structure. Proetz¹ has called attention to the fact that inspired air traverses an upper course through the nose in the olfactory fissure and that expired air passes very closely through the same channel except for one important detail. On expiration a portion of the air is deflected into the middle meatus by the posterior tip of the middle turbinate. It becomes apparent then, that the ostia of the sinuses are exposed only to the warm moist expired air and not to the cold dry inspired air. He found also that the exchange of air between the nasal chambers and the sinuses was slight, requiring possibly an hour to change all the air within a sinus. Five hundred cubic feet of inspired air enters the nose every twenty-four hours. Air is saturated by the time it reaches the glottis and absorbs about one quart of fluids daily, twenty calories being expended during this period to heat the air. According to Fabricant² the inspired air has been warmed to 37° C. before it reaches the glottis.

Characteristic of respiratory epithelium is ciliary activity. Upon this depends the constant movement of the overlying mucous blanket toward the pharynx, the action becoming increasingly rapid as the mucous sheet is moved posteriorly, and most rapid about and toward the meatuses. Hilding³ believes the sinuses have a new mucous blanket every thirty minutes, and the nasal chambers as often as ten minutes in areas of greatest activity. Thus bacteria and foreign material are filtered out of inspired air.

Aside from the purely mechanical action of the cilia and the mucous blanket, it has been found that the nasal secretions possess certain chemical and physical compounds designed to check bacterial invasion and to preserve the integrity of the underlying cells. Of these Fab-

ricant² has placed considerable emphasis on hydrogen ion concentration. Normally the reaction is slightly on the acid side with a pH value between 5.5 and 6.5. He pointed out that cold infection, allergic reaction and fatigue produces a trend toward alkalinity. A report by Hilding¹ asserts that there is a reduction in the lysozyme content of nasal mucus during acute rhinitis and an increase with recovery. These factors including iso-tonicity have been of assistance in the development of the newer and better vasoconstrictors for local use in the nose, now on the market.

The cilia and the mucous blanket in which they vibrate constitute the first line of defense. The resistance of the tissue and blood cells, and the natural immune reactions constitute the second and third lines of defense. Cilia are quite resistant to most physical agents. Their activity withstands a wide range of temperature, tonicity and hydrogen ion concentration. It has been found further that there is considerable tolerance for most chemical substances. These influences including liquid pus in the amount and concentration to which the cilia are often exposed cause only a modified change in their activity, provided there is no drying. Drying is the enemy of ciliary activity. The ciliated mucous membrane within a sinus may be completely removed and yet after a few months it will be completely regenerated. Drying, however, stops ciliary activity and destroys the cells permanently. The clinical application here is obvious.

ACUTE RHINITIS

The etiology of acute nasal infection is still in a state of confusion. Muco-ciliary activity has done much to point the way to a satisfactory approach to the problem. Still, there are many conflicting views, and a satisfactory means of preventing and treating the common cold has not been found.

Micro-organisms usually found in upper respiratory infections are considered by most observers to be secondary invaders, the initial stage having been caused by a filterable virus. Dochez⁵ and his co-workers place much emphasis on this unidentified virus which has resisted all efforts for therapeutic control. Other factors have been recognized as important in the production of a cold, such as fatigue, worry, chilling, excesses, gastrointestinal disturbances, and allergy. Swindle⁶ has advanced a theory supported by experimental evidence that colds are caused by vasomotor changes due to variations in brain volume resulting in damage to brain plexuses. Tissue reaction and secondary infection governs the symptomatology resulting therefrom. Sewall⁷ believes that an acute cold is due to the activating of a previous chronic sinusitis. When through some circumstance the individual's resistance is lowered, this chronic infection may become active time and again until the focus has been removed. Other investigators have called attention to the possible etiological influences of atmospheric pressure, and the passage of large masses of polar air. Again the ever present factors of immunity, infection and individual resistance must be evaluated as far as possible.

Treatment at the very beginning is to supply moisture and to stimulate ciliary activity. This is accomplished by

use of vasoconstrictors and steam. By opening the nose and the addition of moisture, the air is again prepared for entry into the lungs. Sedation, warmth, rest and sufficient fluids are essential. The usual case of acute rhinitis will recover in a week. If, however, the sinuses have become infected, the rhinitis will run a protracted course. There will be symptoms peculiar to the sinus or sinuses involved. In general the patient should be told to:

1. Stay in bed.
2. Keep the house at an even temperature.
3. Keep the doors open and the windows closed to avoid chilling.
4. Large steaming hot towels to the face and sinuses, the more the better.
5. Aspirin and codein as necessary.
6. Steam and vasoconstrictors (a) privine HCl. 0.1%, (b) tuamine sulfate 1%, (c) neosynephrin $\frac{1}{2}$ to 1%, (d) ephedrine 1 to 3%.

THE MAXILLARY SINUS

During the first week of an acute maxillary sinus infection, the conservative management outlined above is carried out. An acute infection, particularly, in the presence of fever is usually a contraindication to puncture and irrigation. In certain severe cases with swelling and troublesome pain, relief may be obtained by a temporary opening in the inferior meatus by a Wilaminsky perforator. This is a conservative measure and of great value. When in the judgment of the operator, the sinus may be safely punctured and irrigated, the most satisfactory method is by means of a straight needle through the inferior meatus. Canulae for natural opening irrigation are prone to injure the ostium and are condemned by many rhinologists, for it will be remembered how the direction of muco-ciliary activity converges toward the ostia. Any injury in this region will impede the emptying of the sinus. Proetz displacement may be of value in this stage. Infra-red therapy and general supportive measures are useful.

THE FRONTAL SINUS

The typical forenoon and mid-day pain of acute frontal sinusitis is often resistant to treatment. Here again the local and general measures mentioned above should be employed. It is considered bad practice to attempt probing an acute frontal sinus. The irregular and inconstant course of the naso-frontal canal and its proximity to the cribriform plate and meninges makes an external trephine of the sinus safer when drainage must be carried out. This is particularly true of those fulminating cases resulting from swimming.

Osteomyelitis and intracranial complications should be kept in mind and diagnosed as early as possible, but reliance should not be placed on early radiographs, for positive findings usually do not appear for several days.

It must be remembered that the ostium is the one place where the sinus can empty itself. The spiral ciliary action about it must be maintained for drainage. Shrinking, moist heat, morphine or codein if necessary and rest in bed favor the emptying of the sinus. If an external trephine opening has been found necessary, the ostium usually resumes its function following resolution of the

acute infection. Radical surgery should be reserved for those cases which fail to recover by simple drainage.

CHRONIC SINUSITIS

Chronicity brings on thickening of the epithelium and cellular infiltration of the underlying stroma. It is there that the battle takes place between the defense mechanism and the infection. Treatment must therefore be directed to the mucous membrane, and to bolster its defense by local and general measures. Among the general considerations the following should be kept in mind.

1. Tobacco and alcohol are definitely bad for infected sinuses.
2. A straight septum is of the greatest importance.
3. Tonsils and adenoids are a factor in children.
4. The maxillary sinus is the key sinus. It should be given first attention.

Radiography is an aid to diagnosis, alone or as used in conjunction with iodized oil for radiopaque studies. Though the tendency is toward conservatism surgical principles apply here as well as elsewhere.

ALLERGIC RHINITIS

Allergy is a swelling of cells due to a reaction to a substance. Any provocative agent on a sensitive tissue may be allergenic. Allergens may be of three classes:

1. Inhalants such as pollens, house dust or animal dander.
2. Ingestants as food or drugs.
3. Intrinsic or physical allergy, as sensitivity to heat, cold, changes in atmospheric pressure, endocrine dysfunctions and emotional disturbances. Williams.⁸

The first step is to differentiate between allergic and non-allergic sinusitis. The presence of eosinophiles in the nasal secretions and skin tests are aids, but the history is more important. Nasal symptoms persisting the year round are likely to be food allergies. Those of a seasonal nature are likely to be due to pollens. House dust allergy is more pronounced in winter. Substances containing an amine, carboxyl or phenol radical are likely to be allergenic. Five per cent of all people are said to be readily sensitized to such drugs. Iodides, bromides, sera, certain metals, bacterial toxins and the products of infection may cause allergy. Examples: (1) nasal congestion, (2) rheumatism, (3) neuritis, (4) iritis.

Shambaugh⁹ divides chronic sinus infections into two groups:

1. Pure infection chronic sinusitis which comprises about 30 per cent of all cases. In this group the symptoms are slight and the process is usually confined to one side as a single sinus, most often the maxillary sinus. Headaches are usually absent. A scant foul purulent discharge may be present and the prognosis is good with treatment.

2. The allergic chronic sinusitis group comprises about 20 per cent of cases. In this group the symptoms are severe and are attended with headache, fatigue and congestion. It usually involves more than one sinus and is usually bilateral. The discharge is mucopurulent, rather profuse and contains eosinophiles. In this group the allergenic factor must be removed before treatment of the chronic sinusitis can become effective.

METHODS OF NASAL MEDICATION

1. Nasal tampons, medicated.
2. Medication by cotton tipped nasal applicators.
3. Sprays.
4. Inhalations.
5. Nasal jellies and emulsions.
6. Nasal irrigations.
7. Drops.
8. Irrigations, maxillary or frontal.
9. Suction.
10. Proetz displacement.
11. Vaccines and antigens: (a) oral, (b) local, (c) parenteral.
12. Zinc iodization.
13. Electrocautery.
14. Physiotherapy: (a) infra-red, (b) short wave, (c) hydrotherapy.
15. General medication.

The use of sulfonamides locally and internally in sinusitis has failed to produce the splendid results which had been anticipated. They should be used, however, in com-

plications such as orbital abscess, sinus thrombosis and blood stream infections. Penicillin, because of its solubility, nontoxic and penetrating qualities, promises to be of value as an irrigation in sinus and ear infections.

NOTE: Within the necessarily limited scope of this paper no attempt has been made to cover the surgery of sinusitis, differential diagnosis or any discussion of sphenoiditis, ethmoiditis or the relationship of nasal infections to the eye and the ear.

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Physical Allergy and Paranasal Sinus Disease

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THE marked importance of physical factors in connection with disease or abnormal conditions of the upper respiratory passages (especially the para-nasal sinuses) and other body organs has but recently been appreciated. The very newness of the subject makes any discussion or treatise uncertain and incomplete, but the importance of this phenomenon is so great as to merit even the most premature ideas at this time. So little work has been done on this subject that many of the ideas currently held are nothing more than hypotheses or theories, but as long as these theories are workable and useful they may well be used until they have been disproven. The discussion to be given is not set up as a proven thesis; it is merely given to stimulate observation and research along these lines.

The problem is largely one well within the scope of internal medicine, despite the body organs involved. It is undoubtedly a very complicated one. Part of the apparent complication may be due to a lack of knowledge but when we consider the many varieties of physical factors to which man is subject, we cannot expect any other state of affairs. Furthermore, an abnormal condition of the respiratory system produced by physical factors is bound to be frequently complicated with the simultaneous presence of other forms of pathology such as infection, chemical irritation, and anatomical abnormalities.

TYPES OF ALLERGIES

Actually the term "allergy" is (in a strict sense) applied or restricted to an abnormal response of some part of the body to the introduction of foreign protein. Space does not permit a detailed discussion of this *relatively*

well understood subject. The actual cause of the abnormal response is thought to be due to the liberation of histamine-like substances in the body. If the abnormal response occurs in the nose we have hay fever; the bronchial tubes, asthma; the skin, urticaria, eczema or angioneurotic edema; the blood cells, paroxysmal hemoglobinemia, etc. The response may be produced by a single offending substance, or a host of different things. Furthermore, the protein may be introduced by the mouth (food), the nose (dusts), parenterally, etc., and produce the same or similar results. The very commonness of protein allergy⁵ makes it a factor to be kept in mind with any consideration of the body organs liable to be affected by other causes.

For convenience we have used the term "allergy" to denote an *abnormal* response on the part of the body to an outside agent. *Protein allergy* has just been mentioned. The offending proteins are legion, and may be fairly well divided into such groups as foods, pollens, animal dander, vegetable spores, etc. *Chemical allergy* would denote an *abnormal* or *unusual* response to a non-protein chemical introduced into the body. (Using the word "chemical" would actually include protein allergy in its strictest sense.) An example of a (nonprotein) chemical allergy is illustrated by the dermatoses produced by contact of the skin with such chemicals as acetone, benzene, halogen and nitro-benzene compounds, certain plastics, etc. Indeed many chemicals are so irritating that they affect all skin surfaces. But some apparently innocuous substances (i. e., the plastics) severely affect some individuals, and this response must be classed as abnor-

mal or at least unusual. In the respiratory system, some individuals develop severe acute upper respiratory conditions (i. e., acute sinusitis) (from small concentrations of chlorine, alkaline dusts, toxins of disease organisms, fumes from coal or tobacco smoke (products of incomplete combustion), etc. This phenomenon might be called a varied sensitivity, but for convenience has been listed under the term "allergy". In general the abnormal response to chemical agents is temporary, disappearing with the removal of the offending substance. Long continued irritation may lead to hypertrophy or atrophy of the affected tissue as is seen in chronic bronchitis of habitual smokers. Furthermore, a chemical irritation will frequently lower the resistance of the tissue in question to other agents, especially pathogenic microorganisms.

A third type of "allergy" is concerned with the abnormal or unusual response to *physical factors*. Some of the most important of these are humidity, dust, temperature, change in atmospheric conditions, wind and drafts, water forced into the nose in diving, sunlight (especially ultraviolet) and x-rays. It is upon this topic that we wish to confine most of our discussion. The possible ill-effects of sunlight and x-rays will not be considered, because of their relative unimportance in connection with sinus disease. The other factors mentioned have a definite role in all diseases of the upper respiratory tract.

At this time it should be reemphasized that in all "allergic" responses—protein, irritant chemicals, or physical agents—an inherited predisposition or weakness is of great importance. Indeed, the different response to these agents is frequently a familiar one.^{6,11} Witness the known definite tendency for asthma and hay fever to be inherited. And this predisposition to hypersensitivity must always be kept in mind in order to properly evaluate any possible allergic condition. It should also be emphasized that the abnormal response to physical agents seems to bear a close relationship to that of protein allergy. In fact, an individual suffering from the latter disorder is often "sensitized" to the effects of physical agents (the reverse may also be true). Frequently, the elimination of sensitivity to an offending protein is sufficient to remove most or all abnormal response to physical factors. And what has been said about protein allergy goes for chemical irritation as well. Indeed we cannot be certain but that an abnormal behavior toward physical factors is not due to the liberation of similar abnormal histamine-like substances (or abnormal amounts of normal ones) in the tissues.

Furthermore, the problem of mechanical (anatomical) abnormalities is important, although not as important as has been previously assumed. Complete closure of a para-nasal sinus must be relieved, surgically if necessary, and partial obstructions deserve a surgical consideration in proportion to their severity. An abnormally formed organ cannot be expected to behave normally. Certainly an empyema of a sinus must be drained at the earliest possible moment. However, we do not propose to say much about infections of the upper respiratory tract. Such are a problem in themselves and are usually a complication rather than a cause of allergy of any type.

PHYSICAL OR ENVIRONMENTAL FACTORS AND SINUS DISEASE

1. *Chilling drafts.* Chilling drafts about the face and neck present one of the most important problems of all. It would seem that the Creator covered the head of other animals with hair to protect them from drafts, but gave man sufficient intelligence to either cover the face or live in a protected space. The cave men, so we have been told, found caves in which to protect themselves. Until recent times men wore beards and women wore clothes to protect this part of the body. Only in modern times has man covered all his body except the face and neck, and made of it a "radiator" to cool himself in summer and a part exposed to the elements in the winter.

What actual effect the cold draft produces we do not know. We do know that cooling of the back of the neck causes a reflex vasodilation of the nasal tissues in many people. The fact that certain individuals who are allergic to cold break out with hives or urticaria when their body is chilled, makes us wonder if a similar mechanism is not present in the nasal mucous membrane of susceptible (allergic) individuals. In sinus sufferers affected by drafts, almost any part of the face is sensitive to chilling and it seems that the important factor is the differential cooling. Chilling drafts also reduce temporarily the number of leucocytes in the blood. Actual experience has taught us that colds are frequently produced in this way, especially when the individual is relaxed. Also many sinus patients have finally found from experience that they cannot stay long in a draft without a flare-up of their symptoms. All the sinuses and nasal passages appear to be involved in this abnormal response, although the ethmoids are more often the cause of symptoms.

What are some of the most common offenses? First I would mention *sleeping with the windows open!* This American fad undoubtedly causes a needless amount of suffering and disease. For generations, men have feared the night air. They knew it brought illness. They gradually learned to sleep inside or wrapped in clothing to protect themselves. Many of our grandparents even wore nightcaps. And it was not always the mosquitoes nor malaria nor yellow fever that they so unknowingly feared (as is so commonly taught); these habits were prevalent in northern countries where such conditions usually do not exist. Then, when the beneficial effects of fresh air in the treatment of pulmonary tuberculosis became well known, the pendulum began to swing. It has now swung so far that the average American feels that he must be sleeping essentially in the open air in order to be healthy!

As is the case with most fads, there is no logical reason behind most of this behavior. During cool weather a family will live in a house all day long—work, eat and play—with the windows all closed tightly; then when they prepare for sleep (and need *far* less oxygen and give off *far* less CO₂), they open the windows! Furthermore, the same family will sit around fully clothed in the warm house all day, but when they retire they undress and expose the face and neck to the elements even though their resistance while asleep is known to be much

lower! Let us remember that the Eskimo sleeps in a fur sleeping bag and rarely has a cold; the white man sleeps in a draft with the room cold and wonders why he has so much respiratory disease.

The argument for fresh air while sleeping is still further reduced by testing the air for its oxygen and carbon dioxide content (in a room with the windows closed) before and after sleeping. Little if any change results. The great majority of homes are so built that plenty of air goes in and out of the rooms. If anyone has any doubt let him hold a candle next to a window when the wind is blowing. Obviously the windows must be opened on warm evenings, but only for temperature control, or when the humidity is excessively high.

Another notable cause of differential chilling is the habit of sitting with an *electric fan blowing on the face*, especially when the face is covered with perspiration. Some people can date the onset of their sinus symptoms from the starting of such a habit. Likewise, riding in an *open car* or in a rumble seat produces the same effect, unless the individual is not perspiring and the outside temperature is nearly the same as that of the body. We must remember that our faces were not designed as radiators. The veteran horseback rider ("cowboy") wraps his face when he rides far in inclement weather; it takes the dude with an education to disregard such an example, and to merely hang around his neck a gaudy neckerchief that has no real function at all. And what we have said about sleeping in a draft applies to *sitting or standing* in a draft, although to a lesser degree.

The type of clothing worn is important. Most of this is regulated by fashion, not all of which is wrong by any means. The girl with a fur around her neck and sheer stockings on her legs is probably far better off than the man with woolen clothes over his entire body and only a hat perched on top of his head in a wintry wind. It is certainly beyond the scope of the medical profession to change styles; if they could, the first to be altered should be the custom of wearing coats (by men) during hot weather! Such an arrangement leaves the face and neck as the main means of disposing of any excess heat produced by the body (a radiator). A lack of covering of the face and neck during cold weather is similarly important.

2. *Cold Allergy*. As previously stated, certain individuals will break out with hives when the body as a whole is chilled. This is a rare but well established phenomenon. Likewise, there are a few individuals that experience a sinus attack by merely chilling the body as a whole. It is easy to speculate that such a condition is brought about by a localized urticaria-like reaction in the nasal tissues.

3. *Humidity of the air*. The relative humidity of the atmosphere is an important factor in the production of abnormal sinus manifestations. Although important, it is usually secondary to other conditions. A high atmospheric humidity slows up evaporation of the exudates (or transudates) of the nasal mucous membranes, and this in turn tends to cause an accumulation of such semi-solid material with blockage of the natural drainage channels. The ethmoids are probably most often affect-

ed, but the maxillary and frontal sinuses are not infrequently involved. If an individual has pathology aggravated by dampness (as most cases of sinus disease usually are), he will usually be benefitted by moving to a drier climate. However, if a high relative humidity is the important factor, he should experience a similar degree of relief at home with proper air conditioning equipment (usually less expensive in the long run).

Some individuals, on the other hand, find their trouble aggravated by too low a humidity. A very low relative humidity tends to cause excessive drying and cracking (with hemorrhage) of the mucous membranes of the nose and sinuses. In fact, a small but unbelievably large proportion of sinus sufferers, who go to a very dry climate for relief, actually are made worse; also normal individuals making such a change may experience symptoms of sinus irritation for the first time due at least partly to the extreme dryness of the air.

4. *Dust*. Obviously dust must be of considerable importance in the production of sinus trouble. Certainly dusts containing protein will affect those individuals "sensitive" to such substances. Sensitivity to house dust is usually a sensitivity to protein particles in such dust: wool, feathers, animal dander, pollens, fungus spores, etc. Usually such specific sensitivity can be determined by appropriate sensitivity tests.

Also dusts containing irritant chemicals, such as alkaline soil, coal ashes, tobacco smoke, etc., may be irritating because of the chemical constituents. Tobacco smoke irritates the respiratory mucous membranes of most people, even confirmed smokers, and must be seriously considered when a sinus sufferer is addicted to the use of tobacco. Further more, the common practice of universal smoking has placed the non-smoker in contact with large amounts of tobacco smoke in many occupations. Closely allied to irritant dusts is the chemical irritation of the fumes arising from partially combusted fuels: burning coal (slag) piles, truck and car exhausts, etc.

However, chemically inert dust, such as fine sand or clay particles, may produce serious irritation of the nasal mucous membrane if present in large amounts. The finer the dust the more irritating it is. The great dust storms of the "dust bowl" countries have left in their wake many cases of sinusitis, seemingly due to this cause alone. Certainly many fatal cases of pneumonia have been attributed to this cause. And anyone who has been in a sand storm in the desert countries can verify the irritating effect of the dust reaching the respiratory passages. It is not too far-fetched to assume that large cities, where the air is filled with large amounts of fine dust, contribute somewhat to the production of sinus irritation.

5. *Swimming and diving*. Man was not made to be an aquatic animal, for such are equipped with "valves" to cover the respiratory passages when under water. When a man dives, varying quantities of water (irritating to the nasal and sinus epithelia regardless of how pure the water is) rush through the upper air passages. Chlorine in the water, so necessary for sanitary purposes, intensifies this irritation. Sea water is not nearly so irritating; swimming in water containing sufficient salt to be exactly isotonic with the body fluids (0.86 per cent)

should provide no irritation at all (if the water is warm and otherwise pure). The fact is that many people can trace the beginning of their sinus irritation to swimming (diving), and very few sinus sufferers can dive without dire results. Swimming, however, in itself causes no harm if the head is kept out of the water.

6. *Meteorological causes.* I am using this term for want of a better one. It is an entirely new concept in connection with the causes of respiratory diseases; its effects have been but recently recognized and probably are of marked importance. By "meteorological" causes I mean the effect on sinus (and other respiratory) diseases produced by weather changes. Of especial importance are the disturbances preceding and accompanying high pressure storms. We all know how many rheumatics can accurately predict a change in the weather by an increase in their own rheumatic symptoms. Likewise certain cases of sinus disease can closely connect their attacks with such atmospheric changes (or at least the connection can be brought out by a careful history). It is not the change in pressure itself, as such individuals experience no discomfort with pressure changes, *per se*. The best one can say is that the cause is connected with the disturbances preceding or accompanying the atmospheric change or storm. Almost everyone is conscious of this effect to some extent. There are few people who have not remarked "how oppressive" it is just before a storm. It would appear that certain individuals merely have nasal tissues that are unusually sensitive to such atmospheric disturbances.

The ethmoids are most often affected by this physical factor (or set of factors). A marked sensation of mental apathy and dullness together with a feeling of pressure (or else a severe oppressive frontal headache) are the most common symptoms; the symptoms usually subside with the passing of the storm, unless other irritating factors are present.

We have just stated that pressure changes, *per se*, are apparently not the cause of such abnormal behavior, and it is interesting to speculate wherein the trouble lies. Does something interfere with the metabolism of the respiratory (or in the case of rheumatism, synovial) cells? Or is the effect central in origin? It does not seem to be humidity of the air nor the changes in the humidity. Is it a change in the electrostatic charge particles in the air? Or an increase in number or size of the dust particles? No one seems to know. However, the symptoms are real in spite of this lack of knowledge. Individuals exhibiting such symptoms (sinus disease, arthritis, rheumatic fever, etc.) are usually benefitted by going to a calm, stable climate. The only areas in North America that are reasonably free from such disturbances¹⁻³ are southern Arizona, southern California and the northwest part of old Mexico.

Other Complicating Factors. In addition to the factors previously mentioned, certain other entities are of significance in the production of sinus disease. *Lack of exercise* is one of the most important of these. Sinusitis is much less frequently found in individuals who do hard manual labor. According to the Bible, Adam was instructed to earn his bread by the sweat of his brow. Certainly it

seems that such a course is accompanied by less pathology of the sinuses. One hour of sweat-producing exercise each day goes a long way toward increasing the resistance of the body to many diseases; sinus disease is no exception.

Overheating seems to be a factor in many cases. It can usually be traced to chilling of the face and neck (wet with perspiration), as exercising in a gym suit is accompanied by less symptoms. However, anything that increases the blood pressure (eating, exercise, mental excitement, etc.) will aggravate a *pre-existing* set of sinus symptoms by increasing the engorgement of the vessels of the respiratory tissue.

Frequent colds have already been mentioned as an important cause. They cause trouble by leaving the mucous membrane more irritable or more "sensitized" to other forms of irritation of any type. Likewise *mechanical obstruction* of nasal passages predisposes to sinus disease for obvious reasons. There are some who find excessive *mental activity* and nervous tension important. Such may well be the case (probably important in all cases), but its very complexity makes a quantitative estimation difficult.

DIAGNOSIS

The diagnosis is often more difficult than one imagines, as the symptoms may be quite misleading.¹⁴ Obviously, an empyema of a sinus is easily diagnosed, but this represents the end result and is frequently a case for the surgeon rather than the internist. To be of greatest value the diagnosis should be made early. A careful history is most important. The presence of possible sinus disease in other members of the family is an important bit of information; also times of occurrence of symptoms (seasons, time of day, etc.); relation of symptoms to meals, exercise, drafts, storms, etc.; habits in clothes; sleeping habits; effect of dust, etc.

The early symptoms are often misleading. One of the earliest complaints may be a feeling of oppression and despondency (see no reason for living), and often such is dismissed as a neurosis of some type. Probably an appreciable number of so-called neurotics and malingerers may be found in this group. Anorexia is a rather common symptom; also mental apathy and dullness. Eye strain is frequently an early symptom and most sinus cases have been fitted for eye glasses one or more times, in spite of an insignificant error of refraction. Insomnia is also important if present. Headache (around the offending sinuses and frontal area) is usually a relatively late symptom. Nausea and even vomiting are occasionally present even in the absence of gross infection, and other gastrointestinal disturbances (particularly a spasm of the colon) are observed too frequently to be a mere coincidence.¹⁵ A postnasal drip may have been noticed, especially if the patient is intelligent, and probably the cause of the halitosis that is frequently present.¹⁴ Obstruction of the nares (difficulty in nasal breathing) may be a symptom, but its absence in no way augurs against a diagnosis of sinus disease.

An examination will verify many of the points gleaned from the history. The individual may not look ill but

usually appears dull and apathetic. If the case is severe, there may be a ptosis of one or both eyelids. Tenderness over the sinuses (especially the sides of the temples), is a rather constant finding; if severe it indicates an empyema or abscess from obstruction of the sinus openings. Fever is also a sign of marked infection. A postnasal drip is usually present. The use of the x-ray and transillumination are valuable aids in detecting sinus pathology, but negative findings (as in hay fever) do not preclude sinus irritation or disease!

The diseases most frequently causing confusion in a differential diagnosis are migraine, histamine cephalgia, hypertension, nephritis, brain tumor, menopausal syndrome and errors of refraction.¹⁰ Off-hand it would seem that such distinction would be easily accomplished, but many cases require a careful history and examination to exclude such conditions.

TREATMENT

Obviously the treatment consists of removing the cause whenever possible. If an empyema is present, drainage of the pus is imperative—by surgery in some cases. Cocaine packs usually relieve pain quickly, presumably by their anesthetic effect on the branches of the sphenopalatine ganglia.

If a marked anatomical abnormality is present it may need correction. Unfortunately such surgical procedures are in ill repute due to the many cases of unnecessary or too extensive surgery in the past.¹² It is only an occasional case that really needs surgery, and a conservative procedure usually produces the best end results.

In all cases an exhaustive set of skin tests for possible protein allergy should be made, and if an offending substance is found it should be eliminated or a program of desensitization carried out if possible.^{5,6,7,9,11,13} However, in all cases attention to the individual's habits will be of distinct value. Diving must be eliminated. Sleeping in a draft (or a cold room) should be avoided. The individual should provide himself with a reasonable amount of mild exercise daily. Obesity should be corrected. Proper clothes should be worn especially in cold and very hot weather. Cold drafts should be avoided wherever possible. The temperature of the home should be between 68° and 75° F. during the day and not lower than 60° during the night. The humidity should be kept at a comfortable level (usually between 20 and 50 per cent). If excessive dust is a probable factor, a change of occupation or a move to another locality may be necessary. Smoking should be entirely avoided if there is reason to believe dust or fumes are an important factor—a difficult feat for a confirmed smoker. Those individuals markedly affected by atmospheric changes may find marked relief by moving to the southwest, as this remedy seems to be the only one to relieve this particular type of complaint. A routine of histamine desensitization⁴ may be tried, although such a procedure is usually disappointing.

Local treatment is best left to the rhinologist. We have already mentioned the relief of obstruction and drainage of pus when necessary. Nasal packs have their place, but are usually necessary only in severe cases. Astringent nose drops should be avoided wherever possible, as they only provide temporary relief and are irritating to the tissues. Benzedrine inhalers are useful in damp climates only if used sparingly and with good judgment. Frequent nasal douches with warm isotonic saline are apparently harmless and often give lasting relief. Deep x-ray therapy occasionally gives marked relief. However, such a procedure is often disappointing and is certainly a procedure fraught with possible serious consequences.

SUMMARY

1. Non-infectious sinus disease may be classified as arising from (1) protein allergy, (2) chemical irritation and (3) physical agents.

2. The important role of certain physical agents (as drafts, cold, dust, water (swimming and diving), atmospheric humidity, and disturbances accompanying storms) on the production of sinus pathology is discussed; also the relationship and interdependence of these factors to protein allergy, chemical irritation and infection of the nasal tissues.

3. In the absence of protein allergy (hay fever) and infection, the cause of sinus disease can usually be found in physical factors or chemical irritation. The correction or elimination of such factors is usually of marked benefit, and such a procedure can often be accomplished by following simple rules.

4. Only occasionally is a change in occupation or climate necessary. Such changes should be held down to the minimum, not only because of economic reasons, but also because the change may prove of little benefit or be actually detrimental to the sufferer.

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Twenty-five Years of Ophthalmology and Oto-laryngology in North Dakota

Dr. F. L. Wicks, president of the North Dakota State Medical Society, has compiled a booklet of 38 pages that every member of the North Dakota Academy of Ophthalmology and Oto-laryngology will prize. It was written to commemorate the 25th anniversary of the academy's founding "in order that some future historian may have something on which to build." It includes an account of the academy's early days, lists of its officers, of its members past and present, brief tributes to those who have died and general information that will bring back pleasant memories to the older members, to the younger a renewed pride in their organization.

The original constitution was signed by the following:

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G. M. Constans (1929)	A. E. Spear (1941)
H. B. Beeson (1930)	G. A. Larson (1942)
T. W. Buckingham (1943)	

The following members have died:

- G. Golseth (the academy's first secretary) in 1924.
- Martin P. Rindlaub in 1928.
- G. J. Gislason (the father of the academy and its first president) in 1934.
- J. P. Miller in 1940.
- L. G. Smith in 1941.

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Buckingham, T. W.	Bismarck
Carr, A.	Minot
Constans, G. M.	Bismarck
Diven, W. L.	Bismarck
Drew, G. F.	Devils Lake
Foster, Geo. C.	Fargo

Hawn, H. W.	Fargo
Jensen, A. F.	Grand Forks
Joistad, Arthur	Fargo
Lampert, M. T.	Minot
Larson, G. A.	Fargo
McCannel, A. D.	Minot
Oftedal, Axel	Fargo
Oppegaard, C. L.	Crookston, Minn.
Perrin, E. D.	Bismarck
Reichert, H. L.	Dickinson
Robertson, C. W.	Jamestown
Rosenberger, H. P.	Bismarck
Ruud, H. O.	Grand Forks
Ruud, M. B.	Grand Forks
Spear, A. E.	Dickinson
Tainter, Rolfe	Fargo
Wicks, F. L.	Valley City
Winn, W. R.	Fargo
Youngs, Nelson A.	Grand Forks

THE SECRETARY'S FINALE

For nearly eighty per cent of the life of the Academy the writer has been in office—(much too long). Your figures have been juggled to a state defying any bureau of accountants—but at that, he has always been your most humble and sometimes-your obedient servant.

Only the Deity, above, knows whether his efforts in your behalf have been his best—or worse—but it has been a pleasure to serve, therefore to each and all he returns his thanks. It is his personal opinion that he has served as fine a group of men as could be found in any medical organization.

Very few of the charter members of the Academy are now living and active in professional life and the ranks of the present membership will be thinned as time goes on.

It is the hope of the author that each may, however, retain the perspective of his journey on the way, as is presented by Van Dyke in the stanzas on Life:

LIFE

Let me but live my life from year to year,
 With forward face and unreluctant soul;
 Not hurrying to nor turning from the goal;
 Not mourning for the things that disappear
 In the dim past, nor holding back in fear
 From what the future veils; but with a whole
 And happy heart, that pays its toll
 To Youth and Age, and travels on with cheer.

So let the way wind up the hill or down,
 O'er rough or smooth, the journey will be joy;
 Still seeking what I sought when but a boy,
 New friendship, high adventure, and a crown,
 My heart will keep the courage of the quest,
 And hope the road's last turn will be the best.
 Cordially and fraternally,

FRED L. WICKS, M.D.

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THE ROLE OF THE OPHTHALMOLOGIST AND OTOLARYNGOLOGIST IN MEDICINE

It is a pleasant task to assume the guest editorship of this special issue of the JOURNAL-LANCET, because of the real value and pleasure to be derived by its readers. It is felt that the subjects will be of interest to each and everyone and that such a presentation of the so-called special subjects in a general medical journal has long been overdue. I think it was this thought that brought forth such a fine response from our contributors at a time when each minute is crowded with professional work.

Especial thanks for their editorial comments are due to Dr. J. O. Arnson, internist, on the relationship between eye, ear, nose and throat work and general medicine, and to Dr. John Moore, obstetrician, for his similar remarks regarding the field of obstetrics.

Too often the profession and occasionally the specialist looks upon the eye, ear, nose and throat practitioner as one set apart and not interested in the aspects of general

medicine, but merely in a small realm. Nothing could be farther from the truth. The doctor who confines his work to a specialty and loses sight of the fact that he is a doctor of medicine has overlooked or lost sight of his calling—the care of the sick.

With the advances in modern medicine, it is obviously impossible for one entirely to master or be equally skilled in each branch or phase of medicine and surgery. A good general basis must be obtained, but concentration upon one or more fields seems sensible for a certain number in the profession. But with this specialization, interest and correlation with all branches must be maintained by reading, clinical contact with other branches, attendance at general meetings, *et cetera*. Those who are fortunate enough to be associated with a clinic, either private, charitable or general, should make use of the facilities and contacts to keep in constant touch with these different phases of medicine.

Every man in the practice of medicine should also be in touch with the early aspects of many distinctive eye,

ear, nose and throat diseases. To mention a few: He must be familiar with the early aspects of glaucoma, thereby getting the case under care early in the disease and thus preventing blindness. He must recognize the signs and symptoms of a foreign body in the air or food passages and promptly refer the case to a bronchoscopist. Likewise, the treatment of otitis media and infections of the face in order to prevent the disaster of a mastoid or cavernous sinus involvement must be borne in mind. These are but a few instances which come readily to mind.

One issue, such as this, obviously cannot cover the field adequately, and it is with regret that more topics and essayists could not be used, but space prevented this. The endeavor has been to choose a few interesting subjects of value to all medical men and have them treated here. Much could be written about the different diseases and their relationship to the eye, ear, nose and throat, together with the recognition and treatment of many of the more common disorders pertaining to this field, but these have been well treated in the included papers.

Enumerating a few of these diseases and their relationship to the general condition and welfare of the patient, we think of the significance of retinal vessel changes in the course of pregnancy, hypertensive disease, arteriosclerosis, nephritis and diabetes, and the differential diagnosis, treatment and prognosis of these conditions.

Then, the relationship of exophthalmos, especially in connection with Graves' disease, whether it is a thyrotoxic or a thyrotropic disturbance. Tumors of the eye and orbit and their management, in order to assure the utmost in vision or save the life of the patient, are of great importance to the surgeon. The problem of vision in the aging, such as the management of cataract cases, diabetic changes and degenerative diseases, come within this field.

The importance of eye and ear findings in neurological disturbances which often supply data of diagnostic or localizing value to the neurologist and brain surgeon are well known. Let me add a plea at this point. When consultation is requested from the ophthalmologist and otolaryngologist, give the consultant all the information pertinent to and so far obtained in the case. He will get a better over-all picture and can thus intelligently look for obscure signs and findings which might be of value. Here the findings are an adjunct, as are those of the x-ray, clinical laboratory, *et cetera*. Diagnosis should not be a guessing contest. If the consultant is unduly influenced by previous findings, then he should not be asked in consultation, but it is only fair that he have as much of the patient's general picture at hand as is then known.

The bearing that infected tonsils, teeth, sinuses, *et cetera*, have on the general welfare of the patient is well known, and the management of ear and throat infections in the young, especially in this day of nearly universal chemotherapy, is a real problem. Likewise, the early recognition of carcinoma or tuberculosis of the larynx or tumor growths in the nasopharynx is of utmost value, while the subject of what can be done for the deaf pa-

tient opens up a tremendous field for investigation and care of these unfortunate people. All of these are merely a smattering of the important factors for which the medical men and surgeons look to the ophthalmologist and otolaryngologist for advice and care of these patients.

This responsibility rests upon the ophthalmologist and otolaryngologist, and should be readily accepted with the realization that in these specialties we are not set apart as a separate group, but are really a cog, and an important one, in the wheel of the general practice of medicine.

G. M. CONSTANS, M.D.

THE IMPORTANCE OF OPHTHALMOSCOPY IN THE HYPER- TENSIVE TOXEMIAS OF PREGNANCY

The hypertensive toxemias of pregnancy remain difficult diagnostic, prognostic and therapeutic problems. They are likely to remain so until the etiology of them is known. The classification of all of the toxemias of pregnancy by The American Committee of Maternal Welfare, Inc., is of great value. I urge its adoption by every physician practicing obstetrics and by every hospital admitting maternity patients.

For the purpose of this discussion, I am limiting my remarks to the first two groups of this classification: Group A, Diseases not peculiar to pregnancy, which include (1) hypertensive disease and (2) renal disease. Group B, Diseases dependent on, or peculiar to, pregnancy. This group includes (1) pre-eclampsia and (2) eclampsia. In these two groups, which include all of the so-called hypertensive toxemias of pregnancy, the obstetrician often faces problems of great diagnostic and prognostic importance. The clinical triad of symptoms, edema, albuminuria and hypertension, are important; but from a prognostic standpoint, leave much to be desired. From a prognostic standpoint and, particularly, as an index of the severity of the toxic symptoms present, I have been greatly impressed by the importance of the ophthalmoscopic findings in patients with hypertensive toxemia, either Group A or Group B. For the past ten years, routine ophthalmoscopic examinations have constituted part of our pre-partum examinations of all of our obstetric patients. When dealing with one of the hypertensive toxemias, we believe that the ophthalmoscopic findings are of particular importance in deciding when pregnancy should be interrupted. Fortunate, indeed, is the obstetrician who has access to the services of an ophthalmologist as a consultant in the toxemias of pregnancy! But the obstetrician or the general practitioner can readily acquire a working knowledge of the ophthalmoscope and learn to detect the toxic and vaso-spastic changes associated with the toxemias of pregnancy with a surprising degree of accuracy. I urge the use of this most valuable instrument in obstetric practice. In my opinion it ranks in importance with the sphygmomanometer in a study of the hypertensive toxemias of pregnancy, and it probably has more importance in determining prognosis.

JNO. H. MOORE, M.D.

THE EYES IN MEDICAL DIAGNOSIS

If the eyes are the windows of the soul to the poets, then surely to the physician the eyegrounds are the windows of pathology. In the compass of an editorial it would be impossible to discuss the details of diagnostic corroboration which the retina reveals to the student of ophthalmoscopy. One can only briefly enumerate them.

Many diseases leave their telltale marks on the retina; witness the chorioretinitis of syphilis and the pallor of the anemias. True, in some instances eye findings are of little help but in others, great.

In the field of cardiovascular disease, in hypertension and arteriosclerosis, the eyegrounds reliably demonstrate pathologic change in the blood vessels. With the eye findings the prognosis can be predicted and treatment better prescribed. Indeed, the seriousness of hypertension or the early diagnosis of the malignant type cannot be determined without them.

Frequently, the gravity of diabetes and nephritis is first revealed by retinal pathology.

In intracranial lesions study of the eyegrounds gives us invaluable assistance and often the ultimate diagnosis of brain tumor depends on a choked disc or abnormalities in the visual fields.

It would be impossible to evaluate the common symptom of headache without careful scrutiny of the eyes. A host of nervous symptoms, sometimes apparently unrelated to visual defects, have their origin in maladjustments resulting from disturbances of vision.

The importance of good vision is emphasized by the stress laid upon it by industry and the armed forces in applicants for their services.

No thorough clinical investigation is complete without a study of the eyegrounds, visual fields and vision. Such a study often unexpectedly rewards the painstaking clinician and the experienced diagnostician does not neglect it. No practitioner, no matter how humble, need be denied this rich field of diagnostic aid. It is his for a modicum of study and endeavor.

J. O. ARNSON, M.D.

Book Reviews

Rorschach's Test. Vol. I. Basic Processes, by Dr. SAMUEL J. BECK. New York: Grune and Stratton, 220 pages. 1944. \$3.50.

This treatise is exclusively a reference book on the Rorschach Test which is being used quite extensively in the evaluation of both the normal and abnormal personality. The use of this procedure requires a great deal of training and experience, and this manual is an effort to standardize and simplify the scoring of the various responses to the test. In this book, the author attempts to show that the Rorschach Test is objective and repeatable. This work is extremely technical and detailed and, therefore, will prove useful only to those actively engaged in the application of this procedure.

Laboratory Methods of the United States Army, edited by J. S. SIMMONS, M.D., and C. J. GENTZKOW, M.D. Fifth edition. Philadelphia: Lea and Febiger. 1944. 103 engravings, and 8 plates in color; approved by the Surgeon General of the United States Army. 823 pp. \$7.50.

The first edition of this work appeared during World War I, and since that time has passed through three editions. With the outbreak of the present war it was deemed advisable to rewrite and revise this book, but due to the great demands on the time of the Army and civilian contributors, this edition, planned in 1941, has just now seen the light of day. And it is a welcome contribution not only to the Army medical and technical personnel, but to the pathologist, the laboratory investigator, and especially to the clinician who wishes a comprehensive and concise presentation of laboratory procedures. Included in detail are some of the more exotic diseases to which our troops are exposed. Nor have the editors been satisfied with presentation of technic; there are many fine drawings and tables, and maps showing geographical distribution of the unusual diseases. Both the advantages and disadvantages of edited volumes with many contributors are present. Some chapters are much better than others. Interesting are the simplified chapters on Statistical Methods at the end of the book, methods of tissue cultures, and egg inoculation. A useful book, covering all subjects which the Army feels its personnel might encounter, it does not highlight and dwell upon the conditions most often encountered by the average physician. This book should be in laboratories called upon to perform more than routine work.

A Textbook of Histology, arranged upon an embryological basis, by J. LEWIS BREMER, M.D., rewritten by HAROLD L. WEATHERFORD, Ph.D., Assistant Professor of Anatomy, Harvard University. Philadelphia: The Blakiston Co., 724 pages, 598 illustrations. 1944. \$7.

This book, which is the sixth edition of the Lewis and Stöhr *Textbook of Embryology*, is necessitated, according to the new editor, Doctor Weatherford, by recent advances in histology. The book is a digest of the vast literature, and more than 700 selected references appear. There are over 300 new illustrations in this edition. Intended as a text book for medical students, the arrangement upon an embryological basis may have merit in fitting into the medical curriculum. From the standpoint of pure histology this arrangement is not of great significance. Interesting and of genuine value is the generous use of good illustrations. Fine color plates add materially to the usefulness of the book. This book is not involved with confusing controversial material, is concise and well written and may be recommended as an histology text for medical students or physicians.

Diseases of the Skin, by OLIVER S. ORMSBY, M.D., and HAMILTON MONTGOMERY, M.D.; Philadelphia: Lea and Febiger; sixth edition, 1360 pages, 723 illustrations and 6 colored plates, red cloth embossed; 1943. Price \$14.

The authors have renovated and brought up to date the previously well written and popular dermatology textbook. It is really a new book written in the very sincere and uniquely forceful style which characterizes both authors. It is, at the present time, the most inclusive single book on dermatology, so inclusive that it is practically an encyclopedia of dermatology. Not only does it contain clinical descriptions of all varied skin disorders, but it is full of the senior author's personal suggestions on successful therapeutics. The histopathological descriptions which are concise and clear are of themselves worthy of being published in book form. The bibliographies are comprehensive enough to allow a wide latitude of special reading on any of the topics discussed. The authors' presentation of the subject matter is straightforward and into the discussions they infuse their own experiences.

This book is recommended very highly to all medical men as the closest approach to a complete textbook on dermatology. Besides being valuable to a medical student or general practitioner, it can be extremely useful to the dermatologist or general pathologist. In this sense it can be considered as the consultant's consultant.



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News Items

Dr. Daniel S. Baughman of Madison, South Dakota, has been appointed superintendent of the Lake county board of health, succeeding Dr. C. E. Sherwood, city health officer and member of the state board of health and medical examiner.

Dr. Abner Veitch recently of Cavalier and Pembina, North Dakota, has located at Wahpeton.

Dr. Dennis B. Rice of Britton, South Dakota, has retired after twenty-two years of medical practice.

Dr. Warren Alfred Bennett, member of the staff of the Mayo Clinic, Rochester, Minnesota, in the pathology section, was ordered to active duty in the army medical corps, reporting at Carlisle Barracks, Pennsylvania, October 5. He received a first lieutenant's commission.

Global Epidemiology, the first volume of which is about to be released shortly, is a series of books devoted to the geography of disease and to sanitation. The series is designed to cover everything medical of importance and interest to troops, industries and visitors coming into the various countries of the world. This first volume deals with India, the Far East and Pacific area. Its contributors are distinguished public health officers associated with the surgeon general's office.

The New York state department of health has changed its sanitary code regarding the isolation of polio cases to read "until end of the febrile stage." It formerly required fourteen days isolation after the onset.

Dr. Chester W. Lawson, formerly of Glasgow, Montana, who returned from China on the Gripsholm last year, has taken up his residence in Havre, Montana, where he will be associated in practice with Dr. C. Houtz.

Dr. Robert A. Buchanan, practicing physician and surgeon in Huron, South Dakota, for the past fourteen years, has been commissioned a lieutenant commander in the navy and has left for a west coast navy base. Before leaving Dr. Buchanan resigned from the Huron board of education of which he has been president since 1941, and as secretary of the Huron district medical society. After the war Dr. Buchanan expects to resume practice in Huron.

Dr. Edw. C. Rosenow was honored by his associates at a dinner in the Mayo Foundation house September 25th. Dr. Rosenow will soon leave Rochester for California where he will do research at the California Institute of Technology at Pasadena.

Dr. Leo Thelen of Morris, Minnesota, has been granted a commission as lieutenant in the U. S. naval reserve.

Dr. Evelyn G. McLane, of Jackson, Minnesota, has left to become staff physician of the Minnesota colony for epilepsy in Cambridge.

Dr. Chas. L. Sherman, Luverne, Minnesota, has been elected president of the Southwestern Minnesota Sanatorium board for the thirtieth consecutive year.

The National Foundation for Infantile Paralysis announces that the American people have contributed an all-time record of \$10,973,491 to the fund-raising appeal of 1944. This year's donations almost doubled the record of 1943.

Americans had contributed \$13,715,070 in cash and contributions in kind to the Russian war relief in the first six months of 1944.

Paul H. Fesler, who resigned as business manager at Nopeming sanatorium, has been appointed executive secretary of the Oklahoma state medical association.

Dr. Arthur J. Henderson who has served the Kiester, Minnesota, community for 25 years, has been assigned medical officer at the Minneapolis Veterans' facility at Fort Snelling.

Dr. F. D. Gray and Dr. B. C. Ford of Marshall, Minnesota, announce they have returned to private practice. They have been partners in the Marshall Clinic.

Dr. John Tapie of New Prague, Minnesota, has left for an army post in Alabama.

Work on the medical history of the war has been in progress since August 1941 under the direction of Col. Albert C. Love, a veteran of nearly 40 years service in the Army Medical Department. Editors have been selected for the volumes on medical specialties and administrative phases. In addition to the research and editing carried on in the office of the Surgeon General, historical activities will be carried forward by officers assigned to headquarters of overseas theatres where they will secure first hand reports of all medical services, particularly those rendered under combat conditions. Medical histories were published following the Civil war and World war I. British authorities have a similar plan for the medical history of the current war.

Future Meetings

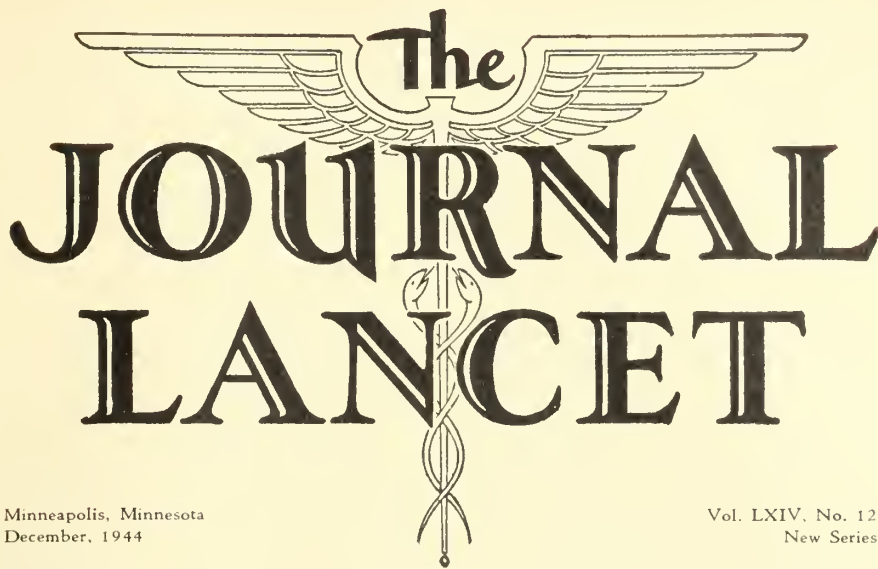
The American Society for the Hard of Hearing observes its 18th annual National Hearing Week, October 22-28 and on November 10, 11, 12, sessions will be held at the Waldorf Astoria, New York City, in which discussions of the medical, educational and rehabilitation aspects of hearing conservation will be featured.

Necrology

Dr. Jarl F. Lemstrom, 63, of Minneapolis died October 1. Dr. Lemstrom had practiced in Minneapolis thirty-seven years and was a member of the staff of Fairview hospital.

Dr. Eugene J. Wilcox, 50, of Drummond, Montana, died in Missoula, October 11, at the family home, after a long illness.

Dr. Dan R. Bennett, 27, Livingston, Montana, died May 23rd of Hodgkin's disease.



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New Series

Urinary Infections in Childhood*

Henry F. Helmholz, M.D.†
Rochester, Minnesota

IN the diagnosis of infection of the urinary tract, it is essential to obtain a specimen of urine which is free from contamination by the vagina or prepuce. Too frequently the admixture of pus corpuscles from a slight vaginal irritation caused by fever has given rise to a wrong diagnosis of urinary infection.

Even today, many physicians consider catheterization a dangerous procedure and feel that it should not be carried out routinely. Experimentally, it is practically impossible to infect the normal animal bladder by the introduction of gram-negative bacteria. If one goes back into the literature, he will find that, in 1883, as excellent an observer as Hirschsprung, of megacolon fame, said that all patients admitted to his service from whom a specimen of urine could not be immediately obtained were catheterized and that he had not observed any untoward results in a series of many thousand cases.

There is just one condition in which the introduction of a catheter into the bladder is associated with danger, namely obstruction at the vesical neck or in the urethra. With residual urine in the bladder, the introduction of even a few bacteria may cause a serious infection.

If the patient is a boy, it is relatively simple to obtain a specimen that is not contaminated by the prepuce. The prepuce is retracted, the glans penis is washed with a little boiled water or tap water, and the boy is asked to micturate into a pan. After he has passed a few cubic centimeters of urine, a specimen of urine is caught in a sterile test tube. This is then examined for pus corpuscles and bacteria. In examining for bacteria, a smear is stained by Gram's method or a culture is made in a tube or on a plate. If the patient is a girl, it is possible to

obtain an uncontaminated specimen of urine by spreading her legs apart and then carefully cleansing the urethral opening with cotton that has been moistened with sterile water or an 0.5 per cent solution of compound solution of cresol, and asking the patient to micturate into a pan. It is easier and less time-consuming to catheterize the patient.

For this purpose, there are short glass catheters, 10 cm. long, which are attached to about 4 cm. of rubber tubing. These are put up sterilely in test tubes. In the office or hospital, cultures of specimens obtained under aseptic conditions can be cultured on plates of eosin methylene blue and blood agar to identify the infecting bacteria. The sediment of a centrifuged specimen of the urine can be spread on a slide, fixed and stained by Gram's method. This will distinguish gram-negative from gram-positive bacteria, which is very important from a therapeutic standpoint.

In the home, only a catheter and a tube of agar are necessary. The catheter is boiled in a pan of water. After the water has cooled, some of it is used to cleanse the external meatus. The tube containing the agar is heated to melt the agar. After the tube has cooled so that it will not cause discomfort when held against the cheek, the agar is inoculated with 3 drops of urine and incubated in the vest pocket for twenty-four hours. The remaining portion of the catheterized specimen can be examined microscopically for bacteria and pus corpuscles either before or after it has been stained.

The streptococcus faecalis, which is the only variety of gram-positive streptococci that will grow on plain agar, is important from the therapeutic standpoint. One can be certain, therefore, that a gram-positive coccus which grows on an eosin methylene blue agar plate is the

*Read before the annual meeting of the North Dakota Medical Association, Fargo, North Dakota, May 8, 1944.

†Section on Pediatrics, Mayo Clinic.

streptococcus faecalis. Is it necessary to determine the kind of infecting bacterium? Before the advent of the sulfonamide drugs it made little difference what the nature of the urinary infection was, because all urinary infections were treated in the same manner; resistance of the various bacteria to therapy did not vary a great deal; in fact, it varied only in so far as it was difficult to acidify the urine when the infecting bacterium had alkalinized it.

The ease of administration and the effectiveness of the various sulfonamide compounds in the treatment of urinary infection caused by gram-negative bacteria have led to the routine use of these compounds in all cases of urinary infection. In my first article on the use of sulfanilamide, which appeared in 1937, and in later articles on the other sulfonamides, I showed that the streptococcus faecalis is not killed by these drugs; in fact, it grows luxuriantly in concentrations of the various sulfonamides that will sterilize urine infected with escherichia coli within twenty-four hours. It has been my repeated experience that, in cases of urinary infection in which a primary culture discloses only escherichia coli, after two days of treatment with one of the sulfonamides a pure culture of streptococcus faecalis can be obtained. The following case illustrates definitely the necessity of identifying the infecting bacteria by culture.

A patient was operated on, at the Mayo Clinic, for a large ureterocele. The patient returned home against our advice while blood, pus corpuscles, and bacteria still were present in the urine. For one year this patient was treated with various sulfonamides without any effect; therefore, further operative procedures were considered necessary. A culture of the urine disclosed streptococcus faecalis. Cystoscopic examination revealed that the bladder and ureters were normal. The infection was cleared up in the course of the next ten days by means of mandelic acid therapy. If a culture had been taken many months before, it would, in all likelihood, have brought about a change in drugs and a rapid cure of the infection.

Having established the presence and the nature of the infection, one must determine the state of renal function and presence or absence of obstruction of the urinary passages.

In the average case in which the patient is a child, urinary infection clears up rapidly under drug therapy; therefore it hardly seems necessary to determine the concentration of blood urea, to perform a phenolsulfonphthalein test, or to make an excretory urogram, unless the infection recurs or persists in spite of drug therapy. The more experience I have with abnormalities of the urinary passages, which occur in about 5 per cent of all individuals, the more I am inclined to use excretory urography as a measure of safety for the early recognition of obstruction stasis in the urinary passages. Many infants, children and adults who die of renal failure might be saved by early recognition of obstruction and infection of the urinary tract. The diagnosis of urinary infection is largely a matter of obtaining an uncontaminated specimen of urine and examining it microscopically and by bacterial culture.

It might be advisable to say a few words regarding the history of various drugs that have been used to combat urinary infection. Bokai in 1878 recommended alkalinization with sodium bicarbonate in cases of infection in

which the urine is acid, and acidification in cases of ammoniacal cystitis. Even to the very present, some physicians believe that alkalinization of the urine is the treatment of choice in cases of urinary infection in which the patients are children. About all that can be said for such treatment is that it may produce a diuresis. It is of practically no value as compared with the administration of drugs which have been introduced more recently. Methenamine, introduced by Nikolaier in 1894, is probably the best of the urinary antiseptics that were used before the ketogenic diet was introduced in 1931. The introduction of the effective beta-oxybutyric acid was rapidly followed by the introduction of another organic acid, mandelic, by Rosenheim in 1935. This made it possible to administer an organic acid orally instead of using the ketogenic diet to produce it in the body.

It will be noted that methenamine, the ketogenic diet and mandelic acid all require a definite urinary acidity for the development of their action. The necessary acidity seems to be at or about pH 5.5. The attainment of this degree of acidity is the stumbling block to treatment in many cases of urinary infection. Two distinct groups of cases are recognized: (1) the group in which the kidney is damaged and cannot excrete the acid in sufficient concentration, and (2) the group in which the infecting bacteria produce an alkalinity that persists in spite of acids and acid-forming salts.

The introduction of sulfanilamide in 1936 was a great advance, because it acts in both acid and alkaline urine and is excreted in the urine by the damaged kidney in bactericidal concentrations. The sulfonamide drugs thus fitted right into the weakest spot in our armamentarium in the treatment of urinary infection. The only weak spot of the sulfonamides is their total lack of effect in infection with the streptococcus faecalis. On this hinges the important reason for cultures of the urine in the treatment of urinary infection.

In order to simplify the use of the various antiseptic drugs and their necessary concentration in the urine I have inserted a series of tables which are practically self-explanatory. They show the simplest routine procedure and the exceptions and variations of therapy when more simple procedures are not successful. The simplest treatment should be the treatment of choice.

The sulfonamides are selected because they are very unlikely to cause any nausea or renal damage when administered in doses necessary to produce urinary antiseptics. The dose of these drugs is small, the reaction of the urine does not need to be taken into account, and the drug is excreted by the damaged kidney in bactericidal concentration.

TABLE 1
Use of Sulfathiazole and Sulfadiazine as Urinary Antiseptics

CONDITION NECESSARY FOR BACTERICIDAL ACTION OF URINE.
Concentration of 100 mg. per 100 c. c.

DOSAGE.

½ grain (0.032 gm.) per pound (0.5 kg.) of body weight in 24 hours. Given in 4 doses; after meals and at bedtime. Adult dose 30 to 45 grains (2 to 3 gm.).

PROCEDURE.

1. Keep urine sterile for 4 to 6 days.
2. Culture urine for sterility not less than 4 days after administration of drug is discontinued.

Table 1 shows the mode of procedure with either sulfathiazole or sulfadiazine. These drugs seem to be more effective in lower concentration than do the other sulfonamide drugs. Emphasis should be placed on the determination of urinary sterility after the administration of the drug has been discontinued.

The one great drawback of sulfonamide therapy is its ineffectiveness in cases of streptococcus faecalis infection.

Table 2 illustrates the failure of sulfonamide therapy and the rapidly successful treatment with mandelic acid in a case in which urinary infection was due to streptococcus faecalis.

TABLE 2
Urinary Infection With Streptococcus Faecalis Cured With Mandelic Acid After Failure With Sulfanilamide

Day	Treatment	Dose		Pyuria, grade	Sulfanilamide, mg. per 100 c.c. of urine		Organisms per 0.5 c.c. of urine
		Grams	Times per day		Free	Conjugated	
1	Sulfanilamide	0.33	6	3	—	—	Innumerable
2	Sulfanilamide	0.33	6	1	—	—	900
3	Sulfanilamide	0.33	6	1	52	31	Innumerable
5	Sulfanilamide	0.33	6	1	98	68	Innumerable
6	Ammonium mandelate	1.0	4	1			Innumerable
9	Ammonium mandelate	1.0	4	0			0
11	Medication discontinued			0			0
14	None			0			0
20	None			0			0

Table 3 shows the mode of procedure when mandelic acid is used.

TABLE 3
Use of Mandelic Acid as a Urinary Antiseptic

<p>CONDITIONS NECESSARY FOR BACTERICIDAL ACTION.</p> <ol style="list-style-type: none"> 1. A concentration of 0.5 to 1 per cent of mandelic acid in the urine. 2. A pH of 5.5 or less (nitrazene paper). <p>DOSE.</p> <p>1 gm. of ammonium or calcium mandelate in 24 hours for each 100 c.c. of urinary output. Adult dose: 3 gm. 4 times a day after meals and at bedtime.</p> <p>PROCEDURE.</p> <ol style="list-style-type: none"> 1. Keep urine sterile for 4 to 6 days. 2. Culture urine for sterility 4 days after discontinuing administration of drug.
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Patients with markedly impaired renal function cannot excrete mandelic acid or methenamine in bactericidal concentrations but can excrete the sulfonamides in such concentrations. When the renal damage is unilateral,

TABLE 4

The Striking Effect of Small Doses of Sulfathiazole in Controlling the Pyuria Associated With High Concentration of Blood Urea

Boy, 16 years of age. Left clinic 2-24-41, while taking 0.06 gm. of the drug twice daily. Urine clear until administration of drug was stopped 3-21 because of a convulsion.

Date, 1941	Blood urea, mg. per 100 c.c.	Urine			Dose		Remarks
		Pyuria, grade	Bacteria, per 0.5 c.c.	Sulfathiazole, mg. per 100 c.c.	Gm.	Total daily dose, grains	
3-24	222	4	Innumerable		0.012 x 5*	1	Pseudomonas infection
3-27		4	200	1.0	0.012 x 3†	3/5	No medication from 10 p.m. 3-26 to 4 p.m. 3-27
3-28	222	2	400	1.0	0.012 x 5*	1	Urine cloudy
3-29		1	550	1.0	0.012 x 5*	1	Urine crystal clear

* x 5 = five times daily
† x 3 = three times daily

the vesical urine may become sterile, in the course of treatment, as the result of excretion of a strongly bactericidal urine from the normal side, but relapse may occur immediately with the cessation of treatment.

Table 4 shows the very remarkable effect of 1 grain (0.065 gm.) of sulfathiazole a day in rendering a markedly cloudy urine crystal clear. The number of bacteria was reduced from innumerable to 550 in 0.5 cc. of urine. To be emphasized is the fact that the infection was due to Pseudomonas. This type of infection usually is very resistant to therapy. The concentration of blood urea was more than 200 mg. per 100 cc.

Finally it is important to emphasize the need of further work with new compounds to fill in the gap in successful therapy in cases of streptococcus faecalis infection in which the kidney has been damaged.

Very recent work with penicillin indicates that with a concentration of 3 Oxford units of the drug per cubic centimeter the streptococcus faecalis is killed. Inasmuch as penicillin can be excreted in a concentration as high as 30 units per cubic centimeter, it seems probable that the damaged kidney will secrete 3 units per cubic centimeter, which will make this drug useful in treating streptococcus faecalis infection in cases in which the kidneys have been damaged.

The preceding tables illustrate the treatment in average cases of urinary infection in which the patients are children. If the treatment is not rapidly successful, and in all cases in which renal function is decreased or obstruction of the renal passages is present, the help of a urologist should be sought immediately, so that obstruction of the urinary passages can be eliminated at the earliest possible moment. The early recognition of urinary obstruction may be lifesaving.

External Steinman-Pin Fixation of Intertrochanteric Fractures*

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THE trend of fracture treatment is toward methods designed to make the patient more and more ambulatory. By ambulatory is not necessarily meant that the patient is bearing weight on the fractured limb but rather that he is getting around early on crutches. The treatment of femoral neck fractures has received a great deal of attention during the last few years. The patient can be made ambulatory by the Smith-Petersen nail, the Austin Moore pins and several other methods.

A marked forward step in the treatment of intertrochanteric fractures was made when Drs. Roger Anderson, W. B. McKibbin and Ernest Burgess^{1,2} published their method of external fixation. The treatment of intertrochanteric fractures up to the time of their article had been more or less neglected while most of the improvement in the treatment of hip fractures was limited to that of the femoral neck. With modern treatment neck fractures of the femur are fairly easily reduced and mobilized but are prone not to heal in a large percentage of cases. On the other hand intertrochanteric fractures will unite under almost any kind of treatment if the fragments are in fair apposition and reasonable immobilization is present. The catch in the past has been that too many times the patient died before the fracture healed. Too often the elderly person dies when he is kept immobilized in bed over a long period of time. We are prone to be careless with intertrochanteric fractures, knowing they will heal, and to forget that the patient also must be treated lest he die from being immobilized flat on his back. Statistics show that proportionately more people die of intertrochanteric fractures than of neck fractures. This danger is being avoided by open reduction and plate immobilization, and, more recently, by closed reduction and external pin fixation.

The technic of this method as given below is practically the same as that of the originators. One slight change has been made to help the occasional operator who does not have a large number of these fractures—as is the case with the writer. The original article should be read by anyone choosing to use this method. The equipment used is that developed by Roger Anderson. The reduction and immobilization should be made as soon as possible, with the aid of pentothal sodium followed by nitrous oxide, or beginning with a spinal of 50 mg. of novocain or metycaine and if the spinal wears off before completion of the pin insertion, ending up with pentothal sodium or nitrous oxide. Preoperative sedation may be used according to the operator's personal preference.

A blood count and urinalysis, and a general examination with special attention to heart and blood pressure

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should be made as soon as possible. If a severe anemia is present, as is sometimes the case in these old people with poor diets, a transfusion should be given before reduction. The heart may need digitalization and dehydration may need correction, but outside of these procedures the sooner the fracture is cared for the better. Old people may die from hypostatic pneumonia while the doctor waits to see if they can stand reduction and immobilization. The pain of a non-immobilized intertrochanteric fracture is probably more of a shock to the patient than external Steinman-pin fixation.

The procedure of fixation is as follows: The patient is anesthetized and the fracture reduced, on an orthopedic table, or if this is not available, any apparatus by which traction can be kept on the leg while the pins are inserted will serve. Be sure that lateral as well as anteroposterior views have been taken before attempting reduction. A posterior displacement of the distal fragment is difficult to reduce and "forewarned is forearmed." It is worth while to remember that if the fracture is of several days' duration and there has been no traction, a little more manipulation and traction is necessary than if it is a fresh break. The fractured leg is then fastened to the foot piece at about 20 degrees abduction and ten degrees internal rotation. The internal rotation is very important as it brings the neck parallel with the floor and allows the pins to be inserted also horizontally or parallel with the floor. The other leg is placed at 30 or 35 degrees to facilitate the taking of lateral x-rays.

After reduction the skin is prepared over the entire lateral aspect of the thigh from the knee to the iliac crest and medially to the symphysis pubis. A heavy skin-clip or a towel clamp is then fastened to the skin 1/2 inch below Poupart's ligament and halfway between the anterior superior iliac spine and the pubic spine. This should mark the articular surface of the femoral head as is verified by the postreduction x-ray. Also at this time I feel it is of definite help to take a Kirschner wire and insert on the later aspect of the thigh so that it scrapes the shaft anteriorly and is directed towards the skin clip. The point of the wire should not extend beyond the base of the neck to avoid possible injury to the femoral vessels. Anteroposterior and lateral views are then taken. The patient is then draped. It saves a little time to delay the draping until this point is reached.

The first set of films, taken in operating room, will show, in addition to the success of the reduction, the relationship of the skin clip to the femoral head and also the relationship of the guide wire to the desired path of the Steinman pins. (These films are not reproduced.) The other plane is correctly obtained by keeping the pin horizontal, provided the knee is kept rotated internally 10 degrees.

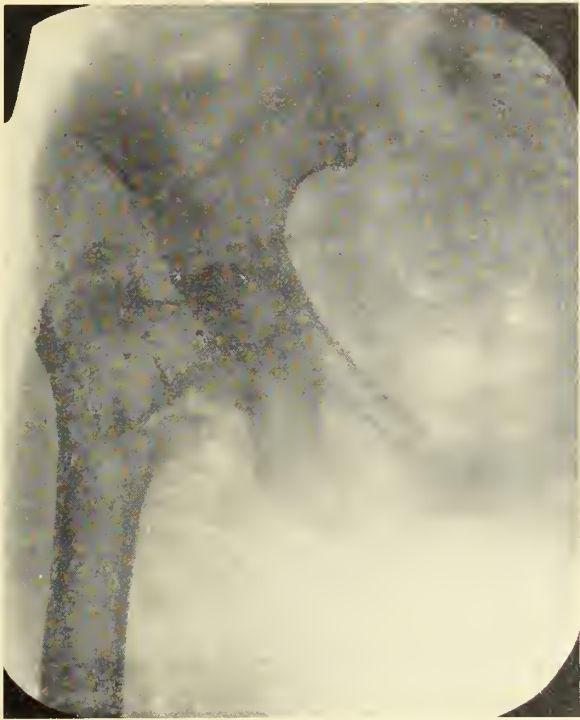


Plate 1. Before reduction. (Lateral taken also but not shown.)



Plate 2. After insertion of pins. Distal pin should go through opposite cortex.



Plate 3. Lateral view after insertion of pins.



Plate 4. Six months after reduction.

A 5/32-inch pin 8 to 9 inches long, depending on the size of patient, is then inserted through the skin and the lateral aspect of the femoral shaft. The pins should be inserted through the skin so that they do not tend to compress or dimple the skin against the bone. The femur may be quite definitely outlined by probing with a Kirschner wire. The first pin should be inserted so that it enters the femur about three inches below the lower margin of the greater trochanter and then hugs the inferior margin of the neck and penetrates to within one-half inch of the articular surface of the head. A pin inserted in this area has always been found to be still quite firm in the bone at the time of removal while the others have been fairly loose. The reason for this is that the strongest lines of force run in this area and the bone is quite compact. The guide wire is now removed. A second 5/32 pin is then inserted into the upper part of the shaft through the middle of the lateral surface, directed toward the knee and parallel with the long axis of the bone; last but very important, the pin should penetrate the medial cortex. Anteroposterior and lateral films are now taken. (This is the second set of films but they are not shown in this paper.) While these are being developed, two pin clamps are applied to the pins and a rod is inserted through the clamps. A third pin clamp is then applied to the rod at the upper end to serve as guide for the third pin. If the roentgenograms are satisfactory, this third pin is inserted about three-fourths of an inch above and parallel to the first pin introduced. At this time also the first and second pins can be introduced

further or withdrawn as indicated by the roentgenogram. The clamps are then removed and dressings placed around the pins. The clamps are then reapplied snugly against the dressings and tightened. The pins are then cut off if too long. Usually a file is necessary for this. A light plaster dressing around the thigh and over the fixation apparatus is recommended. This prevents pressure on the soft tissues of the thigh and "riding" of the tissues in and out on the pins. Also it keeps the patient's fingers away from the pins. Shellac on the cast will protect it against softening from urine or spilled liquids. Plates 3 and 4 show the complete operation.

The day after reduction movement of the leg should be encouraged. Getting up in a chair and using crutches should be encouraged as soon as the age and physical condition of the patient permit. There should be an overhead on the bed with a hand bar. Exercise of the body as a whole should be insisted upon. If this is not done the purpose of this type of treatment has been defeated. The aged must be kept active or they soon deteriorate both physically and mentally. If possible it is preferable to send them home in two weeks to pleasant and familiar home surroundings. The pins may be removed in about eight weeks if the roentgenograms show no contraindications. Plate 4 shows the final result.

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The Symptom of Headache*

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PROBABLY the oldest symptomatic complaint known to man is the one of headache. It is still said to be the most common complaint for which the patient consults the physician.

There is no special field of medical practice in which the clinician is more often confronted with this symptom than in the practice of rhinology. The rhinologist has not fared too well in the management of headache. This led one of my friends to say that "the nose and throat man has sold his birthright for a mess of instruments." I regret to admit that he was right. Many are the victims of nasal surgical procedures or prolonged medical treatment designed to cure a chronic headache the proven pathological basis for which was hardly more than wishful thinking.

These facts initiated my interest in this subject. As I pursue this interest, I am impressed with the probability that the rhinologist knows too little general medicine and the physician in general medicine knows too little rhin-

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ology. The remedy for this situation may be found in a review and the application of basic facts which have accumulated from some recent and some older observations.

OBSERVATIONS ON THE MECHANISM OF HEADACHE

In recent years there has accumulated considerable information on the mechanism of headache. The research publications of the Association for Research in Nervous and Mental Disease assembled in a volume entitled *Pain*,¹ in 1943, reveal some of the pain pathways and mechanism.

These studies determined that:

1. Of the tissues covering the cranium, all were more or less sensitive to pain, the arteries being especially so.

2. Of the intracranial structures, the great venous sinuses and their venous tributaries from the surface of the brain, parts of the dura at the base, the dural arteries and the cerebral arteries at the base of the brain, the fifth, ninth and tenth cranial nerves, and the upper three cervical nerves were sensitive to pain.

3. The cranium (including the diploic and emissary veins), the parenchyma of the brain, most of the dura,

most of the piaarachnoid, the ependymal lining of the ventricles, and the choroid plexuses were not sensitive to pain.

From the data available, six basic mechanisms of headache from intracranial sources have been formulated. Headache may result from:

1. Traction on the veins that pass to the venous sinuses from the surface of the brain and displacement of the great venous sinuses;
2. Traction on the middle meningeal arteries;
3. Traction on the large arteries at the base of the brain and their main branches;
4. Distention and dilatation of intracranial arteries;
5. Inflammation in or about any of the pain-sensitive structures of the head, and
6. Direct pressure by tumors on the cranial and cervical nerves containing many pain-afferent fibers from the head.

Traction displacement, distention, and inflammation of cranial vascular structures are chiefly responsible for headache.

Pain referred to the head from disease of tissue not in the head does not occur, with the rare exception of pain in the jaw or neck with angina pectoris. Sepsis or fever of any organ may be associated with headache, but this is not referred pain.

The inference is that the mechanism of headache as a symptom of disease outside of the head is dependent upon a vasomotor phenomenon. With this understanding, a study of headaches associated with changes in intracranial pressure, brain tumor, the presence of fever, migraine, and hypertension revealed that:

The headache associated with either decreased or increased intracranial pressure results from traction upon or displacement of pain-sensitive intracranial structures and is independent of generalized intracranial pressure changes per se.

Brain tumor headache is produced by traction upon intracranial pain-sensitive structures, chiefly the large arteries, veins and venous sinuses, and certain cranial nerves.

Observations of the amplitude of pulsations of the cranial arteries during headache associated with experimentally induced fever showed that the spontaneous increase and decrease of intensity of the headache paralleled the changes in amplitude of pulsations in these arteries. The observation was made that increasing the cerebrospinal fluid pressure in the subarachnoid space relieved fever headache (Pickering).

The headache of migraine seems to be due to dilatation and distention of the extracranial and possibly the dural branches of the external carotid artery.

The headaches associated with hypertension arise from dilatation and distention of certain branches of the external carotid artery. It bears no direct relationship to the level of blood pressure or pulse pressure.

A CLASSIFICATION OF HEADACHE

Every physician who assumes the responsibility for diagnosing the etiology of headache should be mindful of some sort of headache classification. Most of the classifications have been unsatisfactory because they have

been too complicated. I have modified an old one suggested by Auerbach.² It is simple, rather complete and calls attention to the basic condition of which headache is a symptom. This classification lists three main groups: one, the headaches which are independent of disease in any particular organ or dependent on any generalized affection; another group, those headaches associated with individual organs; and a third group, those associated with generalized disease.

CLASSIFICATION

Independent Forms

Migraine

In nervous and mental states
From posterior neck conditions
"Erythromelalgia" of the head

Associated with Disease of Individual Organs

Brain, eyes, the nasal space, digestive tract.

In General Disease

Infectious diseases
Acute and chronic intoxication
Constitutional disorders.

My purpose in this discussion is to focus your critical attention on the diagnosis of head pain of nasal origin because there seems to be much incorrect diagnosis involving chronic headache and neuralgia from this source. It would probably be desirable to include a more or less complete discussion of all forms of headache, but that would for this occasion make my address too lengthy. I would, however, summarize for you the important aspects of the "independent forms," which are probably less well known than some of the headaches from those types associated with individual organs, and in general disease.

MIGRAINE

Migraine, more commonly known as "sick headache," is characterized by periodic paroxysms of intense pain preceded or accompanied by characteristic sensory or motor disturbances or a combination of these with general vasomotor or psychic phenomena.³ The most frequent beginning site is in the neighborhood of an eye; the sensation may be either above the eye, lateral to it, or deep within it. There is a tendency for the pain to become diffuse and involve the whole side of the head or it to become generalized. The patient may describe the pain as dull, boring, pressing, throbbing, hammering, vise-like, or shooting. The pain tends gradually to increase to an intense degree.

The duration of the headache is variable. It usually lasts more than a day, often for several days. "Abortive" attacks may last two or three hours. An attack may appear at any time of day and even awaken the patient at night.

The patient may have a foreboding—an aura of impending headache; this is really part of the attack.

Gastrointestinal symptoms usually present are nausea and vomiting. Complete anorexia during the headache and abdominal pains are not infrequent, and the patient is usually constipated.

Throughout an attack the patient often exhibits a general hypersensitiveness. He is irritable, though mentally slow, complains of photophobia, and abhors noise.

Certain signs referable to the cervical sympathetic function may be noted, such as pallor and hyperidrosis of one side of the face, and one pupil smaller than the other with absence of normal reaction.

There may also be evidence of general sympathetic dysfunction, such as bradycardia, generalized perspiration, urinary frequency and, in children, pyrexia.

The cause of migraine is unknown. Among the theories advanced are that it is a reflex phenomenon, a toxic metabolic disorder, that it results from mechanical obstructions to the central ventricular system, or that it is a vasomotor disturbance. The last mentioned theory seems to have the most support. Vaughan⁵ has reported a high percentage of cases in which an allergic factor was the cause.

A variety of conditions seems to have a role in precipitating attacks, among these mental and emotional excitement, fatigue, dietary indiscretions, menstruation, etc.

There seems to be a hereditary factor, over 50 per cent giving a history indicating a direct homologous heredity.

The incidence of migraine is difficult to estimate. Puberty is the most frequent time of onset. Relatively few develop migraine after 40 years of age. The condition is more than twice as common in females as in males.

The patient is symptomless between attacks. The course is lengthy and may continue in the same form for years, although the character of the attack may change. The frequency and severity of an attack may be altered in either direction. Natural menopause may be accompanied by a cessation of the attacks.

The treatment consists of avoiding the factors which seem to precipitate attacks. The most effective medication is ergotamine tartrate.

A localized form of migraine referred to as the ophthalmic form occurs in which the prodromata and early symptoms are referable to the visual system. Scotomata and homonymous hemianopsia characterize this form. A rare ophthalmoplegic migraine has been described in which the function of the third nerve is impaired.

NERVOUS AND MENTAL STATES

The incidence of headache designated as neurasthenic or psychogenic is apparently very great. When evidence of any specific cause is lacking, the usual conclusion is that the disturbance has a neurasthenic or psychogenic basis.

Diagnosis is made primarily on a careful history and secondarily on the basis of a negative examination.

In the majority of cases of this form of headache, there is no actual pain, but an oppression, constriction, or heaviness of the head; or the patient may complain of the sensation of pulling or drawing in the occipital region. This may occur in a healthy individual who temporarily suffers from over-exertion or exhaustion, particularly mental. Usually, however, the patient gives a history of considerable nervousness or chronic fatigue.

The sensations are usually situated in or behind the forehead and extend down into the eyes and root of the nose. Less frequently, the temples are involved. There may be the occipital pulling or drawing previously mentioned. The sensation may also be likened to an elastic band encircling the head. The patient frequently refers

to a sensation of the head feeling hollow or empty. Some describe paresthesias of the temples and forehead. Occasionally, the pain may assume a neuralgic character.

This form of headache has no periodicity. It tends to be more or less constant. Many patients have vague general complaints which, in their analysis and from a physical study of the individual, suggest hypochondria.

POSTERIOR NECK CONDITIONS

A number of causes for headache have been found in the posterior neck. Auerbach described a clinical entity under the title of nodular (induration) headache. Small palpable tender nodular or indurated areas occurred in the occipital muscles or fascia of the neck. These caused an occipital ache which remained localized or spread up over the temples. Exposure to cold and chilling precipitated the pain. The nodular or indurated area consisted of a localized muscle spasm causing irritation of sensory nerve endings in the area involved. Treatment with local application of heat, the use of antineuralgics, and supplementary massage invariably brought relief.

Occipital headache originating in the posterior neck has been described as due to myalgia, fibrositis, hypertonic neck muscles and arthritis of the cervical spine. There is a marked similarity in the etiology, age group, manifestations, and treatment.

The chief precipitating factor seems to be exposure to cold. The symptoms are aggravated by fatigue and tight-fitting apparel such as a hat, cap or collar. The discomfort is usually unilateral and consists of a dull but definite ache which is aggravated by movements of the head and neck. When sought for, tender spots may be found on careful palpation over the superior nuchal line, the trapezius, the splenius and scalenus muscles, or the sternocleidomastoid and its fibrous attachment to the mastoid tip. If areas of myositis or localized muscle spasm exist, these will be definitely palpable as thickening or nodules. The fibrositic areas may be palpable, but in an arthritis of the cervical spine, objective evidence is usually lacking except with x-ray examination.

(Areas of myositis or induration have been found in the frontalis muscle causing headache at this site).

The treatment has in part been referred to in the use of heat, antineuralgics and massage. Obviously, massage would not reasonably aid a cervical arthritis. The search for and eradication of toxic foci, avoidance of chilling and fatigue, and the administration of foreign proteins are recommended.

These conditions are uncommon in children and are usually found in the middle age group.

"ERYTHROMELALGIA" OF THE HEAD

A clinical entity has been described recently by Horton, McLean and Craig,⁶ for which the term "erythromelalgia of the head" has been suggested.

The pain is unilateral, a constant, excruciating, burning, boring type of pain involving the eye, temple, neck and often the face. It has none of the tic-like qualities of trigeminal neuralgia; there are no trigger zones. Pressure over branches of the external and common carotid arteries frequently reveals marked tenderness.

The pain may appear or disappear suddenly, last a

few minutes to a few hours and even occur at the same hour of day or night for weeks.

Vasodilatation on the same side of the head as the pain invariably is coincident with the onset of the pain. There result swelling of the temporal vessels, engorgement of the soft tissues of the eye, injection of the conjunctiva, plugging of the nose, profuse watering of the eye and nose, and flushing of the side of the face. All these phenomena are not present in every case.

Partial relief or abortion of an attack of pain can be obtained in a number of patients by the use of salicylates. Abstinence from alcohol, the use of which produced exacerbations, offers some relief.

The fact that the attacks of pain are associated with the phenomenon of vasodilatation suggested experimenting with histamine. Subcutaneous doses of 0.3 to 0.5 mgm. produces the typical syndrome of headache. Intravenous use of vasoconstricting substances controls the attacks. Patients are able to differentiate between induced and spontaneous attacks and immediately after a severe spontaneous attack the 1 mgm. of histamine administered fails to produce a flushing of the face.

Patients can be desensitized to histamine by giving subcutaneously .05 mgm. of histamine twice each day for two consecutive days, increasing the dose to .066 mgm. twice daily on the third day, and to 0.1 mgm. twice daily by the fifth day. This dose should be continued twice daily for two or three weeks. Definite relief was obtained in over three-fourths of the patients. Several who had recurrence were relieved by another course of histamine.

Webster's dictionary defines headache as a pain in the head. This is a practical definition insofar as the layman is concerned. As clinicians we distinguish between headache and neuralgia. Stedman's medical dictionary defines headache as "a diffuse pain in various parts of the head not defined to the distribution of any nerve" and neuralgia as "a pain of a severe throbbing or stabbing character in the course or distribution of a nerve."

So far, we have only considered headaches. The facial neuralgias are not as common as headache. The attempted classification of facial neuralgias like the headache classification has suffered from being too complicated⁴ for practical recognition. I have found it useful in an effort at simplification to list the facial neuralgias in six groups as follows:

THE FACIAL NEURALGIAS

1. Trigeminal neuralgia, primary and secondary.
2. Glossopharyngeal neuralgia, primary and secondary.
3. Vidian and sphenopalatine neuralgia.
4. Neuralgia from disturbances of the temporomandibular joint.
5. Atypical facial neuralgias.
6. Some rare affections such as:
 - (a) Geniculate ganglion neuralgia
 - (b) Tympanic plexus neuralgia
 - (c) Great superficial petrosal neuralgia.

Trigeminal Neuralgia. The diagnosis of primary trigeminal neuralgia (tic douloureux) is by its character never difficult to make. The pain is one of sudden onset, is sharp, lancinating and knife-like, brought on from trigger zones about the face which react to light contacts

or draughts of air. It usually occurs in persons beyond middle age and is confined mainly to the second and third nerve divisions. Attacks may occur every few seconds with intervals of freedom and periods of repeated attacks may last from a few days to a few weeks. Remissions of months to years occur. The disease is almost unilateral. The etiology is unknown.

In the secondary type the pain as a rule is of a more chronic type and the attacks are longer and less severe. Trigger zones are rare. The etiology is found in some lesion irritating one of the nerve roots. Dental and nasal pathology are the more common factors.

Glossopharyngeal Neuralgia. Primary glossopharyngeal neuralgia, a tic douloureux, of this nerve is relatively rare. The paroxysms of stabbing pain in the ear with trigger zones in the tonsillar area of the involved side accompanied by salivation provide a picture in which the diagnosis is not difficult. A secondary form is common. This picture is seen in the earache following tonsillectomy in the absence of evidence of middle ear disease. It can be caused by any inflammatory process involving the tonsillar area and the adjacent area of the tongue. One must not forget, however, that pain in the ear in the absence of middle ear disease is produced by lesions involving the fifth nerve (teeth and temporomandibular joint) and the tenth nerve (a lesion in the pharynx, on the rim of the larynx, or in cervical glands).

Vidian and Sphenopalatine Ganglion Neuralgia. The Vidian nerve with the posterior root of the sphenopalatine ganglion or the ganglion itself is occasionally found to be involved in neuralgic pain on one side of the face. This pain may have a sudden onset, is severe, localized around or back of the eyeball, radiates to the temple, back of the ear to the occiput and down into the neck and even into the shoulder. This description was made by Vail⁷ who believed it represented an irritation of the Vidian nerve in its course below the floor of the sphenoid sinus. The picture for the most part fits the previously described sphenopalatine ganglion neuralgia of Sluder.⁸ The latter described two syndromes from involvement of the ganglion. One was neuralgic and the other "sympathetic" in which the painful picture is supplemented by vasomotor and secretory phenomena.

Since the passing of Sluder and of Vail we have heard relatively little about these conditions. Many neurologists have seemed unwilling to accept Sluder's explanation of these pictures which are occasionally encountered. With the newer knowledge regarding vasomotor disturbances it seems likely that this explanation rather than one of sinus inflammatory change may account for some of the painful and probably all of the vasomotor phenomena. A diagnosis of the origin of the pain in either the vidian nerve or at the site of the sphenopalatine ganglion can be made by controlling the pain with an application of cocaine to the sphenopalatine foramen, the front wall of the sphenoid or actually into the sphenoid sinus.

Neuralgia from disturbance in the temporomandibular joint may result from a change in the bite most often caused by a loss of molar support. Costen⁹ has reported numerous cases. In my experience, the neuralgia is usually located in front of the ear of the involved side.

Costen has described headache from this disturbance as vertex, occipital, or supra-orbital in location.

The *atypical facial neuralgias* comprise a group of ill defined head pains which have been described as deep-seated pains of an aching, burning, or throbbing type which often cannot be accurately described by the patient. The distribution of the pain is within a circular area within the vascular supply of the head. Sympathetic phenomena such as lacrimation, edema, corneal injection, unequal pupils, blurred vision, photophobia, are present in about half of the cases. The writings on this subject suggest many possible etiological factors.¹⁰ A diagnosis of atypical neuralgia is apparently made when the disorder does not fit to a considerable degree one of the well defined neuralgias.

Some rare neuralgias: a *geniculate ganglion* affection is diagnosed by finding the zoster zones involving the external canal and often the concha. Tympanic plexus neuralgia is a rare type of partial tic involving the tympanic branch of the glossopharyngeal nerve (Reichert). Great superficial petrosal neuralgia is the pain accompanying some cases of petrositis. It is retro-ocular in location on the involved side.

THE NASAL SPACE AS A SOURCE OF HEADACHE OR NEURALGIA

The layman and many physicians are prone to attribute the symptoms of headache and often of neuralgia to the sinuses when some obvious cause is lacking. The widely prevalent symptoms of transient nasal congestion and the common postnasal discharge have centered attention on the nose. More objectively, the irregularities of the nasal septum and x-ray evidence of sinus pathology have suggested the possibilities of this apparent close anatomical relationship.

I believe that our mistakes in evaluating the role of the nasal space in the symptom of head pain, particularly a chronic pain, are due, first to an inadequate history, and, second, a lack of information on the problem of headache and neuralgia in general.

Interpretation of the local findings in the nasal space.

If one had to make a diagnosis as to the cause of a given case of headache in which a nasal origin was suspected, and either the history or the local findings was available, the history would certainly be found to be the more valuable. Every observing clinician sees frequent cases of marked irregularity of the nasal septum, hypertrophied turbinates, and x-ray shadows indicating extensive changes within the sinus linings, but in which the patients' complaints do not include headache as a symptom. In numerous cases of chronic bilateral suppurative pansinusitis with polyps, I have made a point of questioning the patient in regard to the symptom of headache. More often than not the patient will inform me that headache is not one of his problems. But, in contrast, we have all seen cases of contact or congestive headache in which the nasal interior showed only a very moderate abnormality but in which prompt relief of the discomfort was obtained by simple shrinkage with ephedrine or some similarly acting substance, or by cocaineiza-

tion. Because of unreliability of attempting to correlate the findings in the nasal space with the symptom of headache, accurate diagnosis in many cases must rest on certain tests, which often are a form of treatment and thus may be termed therapeutic tests.

Therapeutic Tests. It is generally accepted that in acute rhinitis and sinusitis with suppuration, the most important item of treatment is the matter of adequate drainage of any accumulation of pus. If the symptom of pain is present, the usual experience is that when drainage is established the pain promptly subsides and disappears. This supports the idea that the actual cause for pain in the majority of cases is the factor of tension. In chronic sinusitis, pain is usually present only at times of acute exacerbation when drainage is blocked.

The therapeutic tests, then, on which the otolaryngologist can rely, are simple shrinkage or cocaineization in cases of congestive or contact headache, and the effect of drainage in case of an actual empyema of any of the several sinuses. The one remaining form of head pain of nasal origin to provide a diagnostic test for is the neuralgic type. In cases of Vidian neuralgia the instillation of cocaine (4 per cent) into the sphenoid sinus has been absolutely diagnostic in my experience. In placing cocaine against the anterior wall of the sphenoid sinus, I have felt that I am including the sphenopalatine area more or less in the field of the anesthesia so that an exact differentiation could not be made between so-called vidian and sphenopalatine ganglion neuralgia. If the introduction of cocaine into the sphenoid does not relieve the pain and cocaineization of the ganglion does, then I believe we are justified in considering the diagnosis to be a sphenopalatine neuralgia.

When these tests which I have just discussed are applied, it has been my experience that in all cases of headache or neuralgia of a chronic type, the tests are reliable in establishing whether or not the nasal space is an etiological factor in the pain.

To recapitulate, then, we may say that there are three reliable and essential therapeutic tests which may be applied as indicated in a given case of headache of suspected nasal etiology:

1. Simple shrinkage and cocaineization in contact or congestive headaches.
2. Establishing drainage in a sinus in an acute inflammation or empyema.
3. Anesthesia (cocaine) of the lining of the sphenoid sinus for vidian neuralgia and of the sphenopalatine ganglion in cases in which this nerve structure is involved.

SUMMARY

Pain in the head has many causes. It is probably the most common symptom for which the patient consults a physician.

A classification of headache modified from one of Auerbach is offered as a simple, useful one; it is rather complete and directs attention to the basic condition of which the headache is a symptom.

The common facial neuralgias have a pattern in which the diagnosis is not difficult. The "atypical" forms are controversial.

Diagnosis of chronic pain of nasal origin can be made by employing certain reliable therapeutic tests.

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Usefulness of Various Anesthetic Agents in General Practice*

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IN attempting to indicate the usefulness of the anesthetics available at the present time, several factors must be considered. Not the least of these is safety. A fatal outcome as the result of the administration of an anesthetic is a catastrophe from the standpoint of all concerned. This paper will be restricted largely to facts which we hope may interest physicians who have to administer anesthetics in general practice.

For the most part we feel that we should speak of the use of anesthesia for general surgical, obstetric, dental operations and operations on the extremities and on the head and neck. We are assuming that in many of these cases no experienced anesthetist will be available and that the situation may even be such that no physician or nurse can be obtained to give the anesthetic and that a layman may be called to assist. The physician may be entirely alone in providing care for the patient. The place where the anesthetic is to be administered will of necessity not be in a hospital; it may be in an office, it may be in a home, it may be near the physician's office or at a distant point. All these factors must be considered by one who wishes to advise in the use of anesthetics and especially in regard to their usefulness and their safety.

From the medicolegal angle the physician in charge of the case is responsible for the result of the anesthetic unless it is administered by another physician to whom the responsibility for the choice of anesthetic and its administration has been delegated by the operating physician. Juries decide these issues because most laws generally followed were made before the widespread use of anesthetics became common. The scarcity of physician anesthetists has made it impracticable to make specific laws to cover anesthesiology. The present need for physicians to administer anesthetics in both military and civilian practice should be overcome. This will require a radical change in hospital management. If patients are to receive the best care, the cost of that care will more or less prohibit using the anesthetist as a source of income for the hospital, except as the patients benefit by an improved service in this field.

In so far as possible, the agents and methods will be considered in the order of their preference for use in your hands. The most preferred method is infiltration of the line of incision with a solution of procaine hydrochloride. A 0.5 per cent solution generally is used. Anesthesia for a great many painful procedures can be produced by infiltration. The technic in general is to infiltrate the tissue to be incised. One step frequently neglected is infiltration of the most superficial layer of the

skin. Satisfactory anesthesia cannot be obtained unless this is done. Then too, a few minutes—five to ten—should be allowed for the solution to soak through the nerve endings and nerve trunks in order to produce a good degree of anesthesia. For patients who are sensitive to procaine, metycaine may be used since the chemical formula of each of these agents is quite different. If the tissues are infected, one may infiltrate a ring of tissue around the proposed site of the incision so that the needle will not be passed through the infected tissues, or block anesthesia may be employed. The technical steps of this procedure have been described by one of us (J.S.L.¹).

Among the many advantages of local anesthesia or block anesthesia are easy portability of the apparatus and its inexpensiveness. It can be reinforced and made to last as long as necessary; it is not associated with fire hazard; it may be used in almost any case, and it can be used where no assistant is available. It may be used, for example, in the reduction of fracture by injecting the anesthetic into the site of fracture and into the hematoma around the fracture. It may be used in obstetric practice by blocking the perineal nerves near each ischial tuberosity. Under extreme circumstances, even spinal anesthesia may be used in cases in which little assistance is available; however, it should be used only under emergency circumstances. Continuous caudal anesthesia may be used in selected obstetric cases. It seems probable that this procedure might be suitable in at least a third of obstetric cases provided the physician will take the trouble to master the technic of inserting either the needle or the catheter into the caudal canal. For the most part, I believe that the method is not likely to be highly successful in the hands of one who uses it only occasionally.

One way to enhance the effect of local or regional anesthesia is by the administration of a premedicant such as morphine, and a barbiturate in doses just sufficient to fortify the patient and to make him placid. A great advantage in the use of infiltration anesthesia is that it fits in very well with other methods of anesthesia and combined or so-called balanced anesthesia may often be used to advantage. In this connection, however, it should be pointed out that, if sulfonamides are being administered, the use of procaine hydrochloride as a local anesthetic may render a part of the sulfonamide inactive. This, however, is a temporary effect and, in general, it can be ignored.

In the use of local anesthetics, it is important that certain simple and fundamental points be emphasized. One should never be in too great a hurry to read a label and make sure he is using the right drug. He should be en-

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thusiastic enough over local anesthesia to insure having sharp needles and not needles that are old and ready to break. His outfit for local anesthesia, if he is carrying it with him from place to place, should be checked frequently. It should be clean and sterile so that no unnecessary handicap will be encountered when the outfit has to be used.

If local anesthesia proves inadequate for the particular purpose, it may be necessary to employ another method. One of the most satisfactory is the intravenous injection of a small dose of morphine. This drug relieves traumatic pain and frequently will take the place of a general anesthetic by producing a considerable degree of analgesia. This is often the case even with spinal anesthesia when only a few more minutes is required to close the wound but the patient is complaining of pain. The dose of morphine to be used usually is not less than one-eighth grain (0.008 gm.) for an adult and one-sixth grain (0.01 gm.) often may be used. A quarter of a grain (0.016 gm.) is often used for very large, robust patients, but for the most part it is well to inject a smaller dose and to repeat the injection at intervals of ten or fifteen minutes until a reasonably good-sized total dose has been administered—even as much as one-third grain (0.02 gm.). If the patient still has a great deal of pain, an intravenous anesthetic such as pentothal sodium may be used. It is often effective in conjunction with local anesthesia and with adequate doses of morphine. The technic of administration is so comparatively simple in comparison with local anesthesia or inhalation anesthesia that it may prove to be specially useful in situations where little skilled assistance is available.

Venipuncture is important, of course, in connection with this method since without venipuncture the method cannot be used. However, if the surgeon's job is not too exacting in an emergency, he may be able to insert the needle in a vein and have someone else inject the anesthetic agent as and when he directs. Maintenance of a good airway under these circumstances is all important and the surgeon or physician must be prepared to provide such an airway should it become obstructed at any time and, if possible, teach whoever is helping him how to maintain it under the particular circumstances.

Intravenous anesthesia is not recommended for obstetric cases or for patients who suffer from diseases characterized by dyspnea, or in cases in which there is a serious cardiac lesion or any lesion that may cause respiratory obstruction during anesthesia. If intravenous anesthesia is not available, as a rule, in this temperate zone in which we live, ether may be administered by the drop method. This, we consider, in general, next in usefulness and in safety to local anesthesia. These two methods may be combined in many instances. This is true in obstetric practice as well as for other procedures. Most physicians are somewhat familiar with ether and they sometimes can supervise its administration very successfully even by an inexperienced layman if the emergency is sufficient. Chloroform also may be used. It is not as safe as ether but many physicians are familiar with its use, and if it is used only as an analgesic it is for the most part satisfactory.

We would not recommend ethyl chloride; however, if it is the only anesthetic agent available for general anesthesia, it should be administered very sparingly and, if possible, by the drop method rather than by spraying it on the mask.

Gas anesthesia is available only in offices and hospitals, as a rule, unless some ambitious physician has obtained a portable gas machine. Of the gases available today, the most powerful is cyclopropane, which may be administered with a considerable amount of oxygen. In some cases cardiac irritation has occurred after cyclopropane has been administered. Some protection from this effect may be obtained by the use of procaine without epinephrine or by the addition of a small amount of ether. Cyclopropane is used principally when relaxation is desired and when one wishes to avoid the use of ether. Ethylene is a good anesthetic gas but it is not as potent as cyclopropane. It seems to be a valuable anesthetic for a debilitated patient or one in shock. It is nonirritating to the heart. Nitrous oxide, however, is the most readily available anesthetic gas. It is commonly employed by dentists and obstetricians without ether, but it is not potent enough for surgical operations and in most instances ether must be added. The concentration of oxygen usually used with nitrous oxide is 15 per cent, but when ether is added the concentration may be raised to 20 per cent. Usually, 1 to 1½ ounce (30 to 45 cc.) of ether per hour is sufficient. With present-day gas machines, and when soda lime is used for the absorption of carbon dioxide, the machine must be operated properly. Otherwise, too much ether may be introduced into the breathing bag and too much carbon dioxide may accumulate. If too much ether is present, laryngospasm probably will develop; therefore, for occasional users, a gas machine is often not satisfactory except for induction of an anesthesia that is to be maintained by the open drop method. If no gas machine is available and if anesthesia is induced with pentothal sodium and maintained with ether administered by the open drop method, only a small amount of pentothal sodium should be used—usually not more than 0.25 gm. or 10 cc. of a 2.5 per cent solution—and this should be injected slowly. The use of a gas machine in connection with the intravenous administration of pentothal sodium is advantageous and breathing can be watched carefully to see that respiratory exchange is adequate.

We previously have commented on the misuse of gas machines. Fire and explosion hazards with anesthetic gases must be guarded against as a mixture of nitrous oxide, oxygen and ether is very inflammable and explosive, as are mixtures containing ethylene or cyclopropane.

Rectal anesthesia is not satisfactory for general use. It may, however, be used to produce analgesia or as a substitute for heavy preliminary medication. One may use a mixture of 35 per cent olive oil and 65 per cent ether, and use 1 ounce (30 cc.) of this mixture for each 20 pounds (9.1 kg.) of body weight, or he may use a 2.5 per cent solution of avertin with amylene hydrate. The dose should be sufficient to furnish 80 to 100 mg. of avertin per kilogram of body weight. Avertin (tribromoethanol) is easily handled by the body since it is

not exhaled by way of the lungs but is broken down in the liver. Its effect is quite prolonged but it may be given to many patients who also are to receive some other anesthetic. The results of this combined method of anesthesia may be quite satisfactory in selective cases, particularly for children and insane patients and in cases in which the cooperation of the patients cannot be obtained.

Recently the use of curare (intocostrin) has been advocated and we previously have commented on the use of this drug. However, at this time, it seems worth while to speak of both the advantages and the disadvantages of the drug. It depresses respiration very severely and, at the same time, produces relaxation of the abdominal wall. If an overdose is given, artificial respiration must be carried out until the patient can breathe by himself. This is usually possible because the drug is destroyed in the body in a reasonable length of time. At the present time, a solution of curare is supplied for intravenous administration. Each cubic centimeter of this solution contains 20 mg. of curare. The usual intravenous dose of curare is 40 to 50 mg. An additional dose of 25 to 50 mg. may be used if the first dose is not sufficiently effective or after its effect has worn off. That is, one might give a dose to facilitate incision of the abdominal wall and to produce relaxation during the first part of the operation; if the operation is long, a second dose might be necessary to effect an easy closure of the abdominal wall. For the most part, this drug has been used in connection with cyclopropane anesthesia in an effort to keep the dose of cyclopropane small and make it unnecessary

to use more than a trace of ether. Reports are appearing from time to time as more experience is gained with this drug and its use in combination with other anesthetic agents. Its use for this purpose is a new procedure. We are not prepared yet to advise its use until more experience has been gained; then, in all probability, it will be necessary that someone be present to carry on artificial respiration when the drug is used. So, in general practice, it is not yet clear how valuable curare will be.

SUMMARY

In general practice one does not have as great a choice of anesthetic agents and methods as in hospital practice but still there are enough agents and methods that may be used so that the general practitioner can be much more prepared today to relieve pain than he ever was before. A number of texts¹⁻⁵ are available on the subject which make it possible for anyone to acquaint himself with the various technics that are used with various agents as well as with indications and contraindications that have been recognized by various authors.

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Congestive Heart Failure*

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ANY type of heart disease may terminate in congestive failure. This condition is due primarily to a failure of the myocardium with resulting edema, dyspnea and cyanosis. Myocardial failure per se is probably a result of biochemical changes in the individual heart muscle cells brought about by anoxemia. Accumulation of lactic acid in the blood stream due to inability of the body to resynthesize it to glycogen, of patients with congestive failure, causes acidosis, with a corresponding loss of potassium and creatine. A vicious cycle is set up and the heart gradually fails. Inadequate compensation of the heart causes continued accumulation of lactic acid so that the buffering power of the blood is diminished. At first the carbon dioxide tension increases, but with the loss of the bicarbonate base, acapnia occurs, circulation is slowed, and there is diminished cardiac output. Potassium buffers are lost in the attempt to control the acidosis, and this loss of the buffering base from the tissues results in the increase in the body of the normally large oxygen debt.

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It is believed by some physiologists that the permeability of the capillary walls is increased by anoxemia, causing edema of the body tissues. A disturbance of the venous pressure is probably a big factor in the production of this edema. Normally, the blood pressure in the arterioles is 32 mm.; since this is greater than the osmotic pressure of the blood (26 mm. of mercury), the fluids of the blood are distributed to the tissue. The pressure in the capillaries is 12 mm., in the venules, 10 mm.; since these pressures are less than the osmotic pressure of the blood plasma, a reversal of the process occurs and the tissue fluids are re-absorbed back into the blood stream.

Clinically, congestive failure may be due to either right or left ventricular failure or a combination of both. Failure of the right ventricle produces passive congestion of the liver, with a resulting tenderness beneath the right costal margin, dilatation of the veins in the neck, edema, oliguria, albuminuria and cyanosis.

When the left ventricle fails primarily, the usual symptoms are paroxysmal nocturnal dyspnea, or cardiac asthma, cough with bloody or frothy pink expectoration,

Cheyne-Stoke respirations, orthopnea, and signs of pulmonary edema.

Although not an early sign in cardiac failure, edema is probably the most important of all the signs of right heart failure. Clinically, it is caused by an increase of venous pressure. It is usually seen first in the lower extremities; later ascites develops and fluid accumulates in other body cavities. By the time the edema is recognized clinically, there has already occurred a marked increase in the venous pressure and the tissues are all very much water-logged. One should recognize the pre-edema or latent stage of cardiac failure where the only clinical finding may be a decreased tolerance for exertion, or an increase in the venous blood pressure. Many patients who complain of dyspnea, if carefully observed, will show a negative water balance, and if given diuretics, such as ammonium nitrate and salyrgan, will show a tremendous increase in urinary output and loss of weight, with marked diminution of cardiac embarrassment.

Certain associated pulmonary diseases, such as chronic bronchitis, emphysema, and bronchiectasis often may mask the earlier phase of congestive failure.

PAROXYSMAL NOCTURNAL DYSPNEA

Paroxysmal nocturnal dyspnea is one of the first serious symptoms of congestive failure. This is a result of left heart failure. Physiologically, it is probably due to poor oxygenation of the blood during sleep with an increased flow of blood into the right heart, consequent pulmonary engorgement and acidosis of the respiratory center. It is believed that during sleep the respiratory exchange in the lungs is less efficient, while at the same time, with rest, the myocardium improves in function. Thus a larger quantity of blood is drawn from the venous channels with a resulting acute left ventricular failure. At this point, the patient usually awakens and is forced to sit up because of severe dyspnea. During an attack, one usually hears fine, moist rales throughout both lungs, and there may be an expectoration of a frothy blood-stained sputum.

The advance of congestive failure may be slow or rapid. Usually the left ventricle loses ground more rapidly than the less powerful right ventricle, but with continued strain, the right yields to the increasing load, and may give the first sign of cardiac decompensation. With the increase of pressure in the right ventricle, the tricuspid valve may dilate suddenly and cause engorgement of the right auricle. Subjected to this increase in venous pressure the neck veins dilate and stand out prominently, the liver and other viscera show passive congestion, but relief of the dyspnea and thoracic distress usually follows. Engorgement of the liver is a direct result of increased venous pressure, as the veins that drain the liver have free communication with the right auricle. In constrictive pericarditis and rheumatic heart disease associated with insufficiency or stenosis of the tricuspid valve, enlargement of the liver with ascites may be much more in evidence than are the other signs of congestive failure.

The clinical picture of congestive failure is one of a progressive sequence, beginning usually with dyspnea on exertion, and followed later by orthopnea, increased venous pressure, edema and cyanosis. These follow in the above order and at a rate dependent on the degree to

which each is present. Any digression from this relationship usually means that we are not dealing with congestive failure, or that there is some complicating factor present. For example, a cyanosis which is out of all proportion to the degree of dyspnea present, means we are dealing with a congenital heart or a vascular capillary spasm, such as is seen in acro-cyanosis. (In this latter condition, the cyanosis is usually aggravated by cold and exposure). Edema of the lower extremities is often wrongly diagnosed as congestive failure, because the fundamental physiology of cardiac decompensation has not been properly recognized. Obese patients frequently have edema of the lower extremities, especially during warm weather, and dyspnea on exertion as well, but their dyspnea lacks the progression of cardiac dyspnea.

TREATMENT

Treatment of congestive heart failure is essentially the same, regardless of its cause.

Rest. Complete rest, both mental and physical, is most essential. The heart must be given as little work to do as possible. These patients are usually very uncomfortable both day and night, and here opiates, in the early stage of congestive failure are among our most valuable drugs. Reassurance must be offered to both patient and relatives, and the fear of impending death must be allayed, regardless of our own personal pessimism. Tact and understanding in the management of the cardiac patient are prime factors.

Removal of Accumulated Fluids. Fluids are removed from the tissues in order to reduce the peripheral resistance in the arterioles and thus ease the strain upon the damaged heart. It is well to remove first the accumulation of fluid in the pleural and peritoneal cavities by paracentesis, since diuresis is enhanced by this procedure. Therapeutically the diuretics and digitalis are our most valuable agents. It was formerly the practice of clinicians to restrict severely the fluid intake of patients with congestive failure. But this merely added to their discomfort. Many elderly cardiac patients are unable to utilize the fluids already accumulated in their tissues, and may even suffer from dehydration, as indicated by a dry mouth and tongue. It is well known that water is the best diuretic, as far as kidney function is concerned, and therefore fluids should not be restricted too severely. It is a good rule to allow the patient to drink to the point of just satisfying his thirst, an amount that may vary in different individuals anywhere from 1000 to 2000 cc. daily. An accurate record of the fluid intake and urinary output should be maintained. With our present-day diuretics, catharsis is no longer indicated, but it is well to give the patient a mild laxative, such as mineral oil, in order to keep the stools soft, and lessen the exertion of expulsion.

Diuretics. Of those in use today, the mercurial diuretics are probably the most valuable. They act rapidly, and are relatively non-toxic, even when used over a long period of time. These are salyrgan, mercupurin, esidrone. They are best administered intravenously, since sloughing occurs when they are injected into the superficial subcutaneous tissues. A small needle should be used in order to lessen the danger of leakage of the drug into the surrounding tissues. The initial dose is usually

1 cc., and 2 cc. thereafter. Usually this dose is administered every five to seven days, although in severe cases it may be repeated every two or three days. According to Dry, in cases of ascites the introduction of a mercurial diuretic into the peritoneal cavity is more effective than when it is administered by vein. This is a safe procedure, the diuretic usually being diluted with a small amount of ascitic fluid before injection into the peritoneal cavity.

The use of suppositories containing a mercurial diuretic agent should be frowned upon, since the results are never satisfactory—the patient invariably neglects to administer them soon enough—and it threatens the close contact so essential between patient and doctor.

Acid-producing Salts. These are usually given in conjunction with the mercurial diuretics; most clinicians believe that the diuretic action of salyrgan is enhanced by the administration of the acid-producing salts. Keith and Binger proved that the cation potassium has definite diuretic properties, whereas the cation sodium lacks this property. Because of this observation, the nitrate and the chloride of potassium have largely replaced ammonium chloride as diuretic agents. When the concentration of chloride is low of when alkalosis is present, ammonium or potassium chloride may produce better results than potassium nitrate. This is probably due to the fact that the more nearly normal is the constituency of the blood, the more effective the diuresis. To produce adequate diuresis, the dose is usually 2 or 3 gm. in enteric coated pills administered three times daily after meals.

Xanthine Derivatives. These have diuretic properties, but they are not as effective as the diuretic agents already considered. They are: thobromine sodio-salicylate, theobromine with sodium bicarbonate, theophyllin, theocalcin and aminophyllin. The chief objection to their use is the gastric irritation produced when adequate doses are used. Aminophyllin, however, when given intravenously, has been found to relieve Cheyne-Stoke respirations, as well as paroxysmal dyspnea due to heart disease or to an asthmatic state.

MEASURES INTENDED TO IMPROVE MYOCARDIAL FUNCTION

Digitalis. Digitalis is probably the most important drug in the treatment of congestive failure. I will not discuss its effects and therapeutic action, since my predecessor has already discussed this drug in a very excellent paper.

Oxygen. This form of therapy will usually give the cardiac patient instant relief, but the psychological effect can not be disregarded. Most patients associate oxygen therapy with the gravest forms of illness, and often its physiological effects are outweighed by the mental apprehension produced.

Glucose. There is unquestionably an added demand for glycogen when heart failure is present. The physiological effect of glucose on the myocardium is not clearly understood, but it has a definite place in the treatment of severe forms of coronary sclerosis and congestive failure, and sometimes acts favorably in paroxysmal dyspnea when other measures have failed. A 10 to 25 per cent solution of glucose may be administered intravenously in amounts varying from 300 to 400 cc. daily.

Dietary Measures. In controlling edema, it is necessary that the concentration of salt in the diet be low. The diet must be of foods easily digested, the amount limited to small quantities at frequent intervals, rather than three large meals daily. Obviously, an acutely ill cardiac patient can not tolerate food well since the congested gastric mucosa impairs digestion. We generally use a modified Karrell diet, which consists of milk, cream soups, orange juice, and toast, increased later by soft poached eggs, rice boiled in milk, and pureed vegetables.

After compensation has been partially restored, the patient should be put on an acid-ash diet, fairly high in carbohydrates. The so-called acid-ash foods are the proteins, lean meat, eggs and cottage cheese. An adequate caloric intake is essential, but care must be taken that the patient on this diet does not become obese. The acid-ash foods enhance diuresis and are restricted only when the complicating factor of chronic glomerular nephritis with nitrogen retention is present.

WHAT CAN BE EXPECTED AFTER CONGESTIVE FAILURE HAS BEEN CONTROLLED?

The immediate results of treatment of congestive heart failure are usually gratifying. The first breakdown of cardiac reserve, however, represents a serious crisis in the life of the cardiac patient. We know that congestive failure indicates an irreversible process and that sooner or later, it will return. For this reason, frequent periodic examinations of the patient should be made, in order to recognize the first return of symptoms, so that early treatment may be instituted. It is always advisable for the patient definitely to limit his activity. Great care and tact must be used, however, in dealing with these patients, who often must give up a business or seek a different position, and find this new adjustment psychologically difficult.

The importance of relieving the load on the heart must be stressed. The control of hyperthyroidism, toxic adenoma, myxedema, the reduction of weight in the obese, the correction of severe anemia, or avitaminoses, are only some of the factors that must be considered. We have had a patient recently who had a severe congestive failure, found to be due to a toxic adenoma with hyperthyroidism. After treating her congestive failure, the adenoma was removed, with the result that there has been a complete cessation of all cardiac symptoms since her surgery, six months ago.

The presence of cardiac enlargement, valvular disease, hypertension and coronary sclerosis seems to favor the recurrence of congestive failure.

The physician must adopt an attitude of preparedness. He must insist upon close cooperation from the patient. At the slightest sign of trouble, early treatment must be instituted at once. There is much less risk in giving a dose of salyrgan, even when it may prove unnecessary, than in letting the congestive failure proceed beyond the early stages. We do not believe that salyrgan, even when given intravenously once or twice a week, is harmful, since we have treated a patient with congestive failure by this method for the last nine years and have managed to keep her quite comfortable, and with no evidence of kidney damage.

The Cold Pressor Test*

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THE exposure of the skin to sudden cold will result in a rise in both the systolic and the diastolic blood pressures. The rise will occur even if the cold is applied to a very small area of the body surface. It was the utilization of this principle which led to the development of the cold pressor test by Hines and Brown¹ in 1932.

The description of the technic of the test was described by Hines and Brown in 1939² as follows: The subject is allowed to rest in a supine position in a quiet room for 20 to 60 minutes. Several readings of blood pressure are taken until a basal level has been approximated. With the subject still supine, and with the cuff of the sphygmomanometer on one arm, the opposite hand is immersed in cold water (4° Centigrade) to a point just above the wrist. With the hand still in the water, readings of the blood pressure are taken at the end of 30 and of 60 seconds. The highest of the two readings obtained while the hand is in the ice water is taken as an index of the response. The hand is removed from the ice water as soon as the 60 second reading has been made and readings are taken every two minutes until the blood pressure returns to its previous basal level. The nature of the test is described to the patient at the beginning of the rest period so that undue apprehension may be prevented. The temperature of the water should not vary more than 1° Centigrade from 4° Centigrade and its temperature should be measured just before the hand is plunged into it. An elevation above the basal level of more than 20 mm. of mercury in the systolic pressure and of more than 15 mm. in the diastolic pressure indicates a hyper-reactive type of response.

In 1936 Hines and Brown³ concluded that the most probable explanation of the rise in blood pressure in the cold pressor test is that the response is a widespread vasopressor reaction initiated through a neurogenic reflex arc. They found no significant change in cardiac rate or in cardiac output during the test. They stated that "the speed of the reaction and the fact that the reaction is present in completely adrenalectomized dogs and in human beings who have Addison's disease are proof that epinephrine is not the primary factor in producing the reaction. The possibility of a local hormonal substance being generated in the immersed hand as a result of the direct action of the cold is unlikely, as the reaction is not inhibited by a tourniquet placed around the arm so as to shut off the circulation."

These authors found the response to the test to be constant. There was an average variation in range of responses of only 10 per cent in a group of patients who were subjected to repeated tests.

The hereditary factor in the reaction to the stimulation of cold was also studied by Hines and Brown⁴ and by Hines.⁵ The presence or absence of a positive family

history of hypertensive disease was correlated with the type of reaction of the blood pressure to the cold pressor test. The subjects were 256 members of thirty families.

It was found that if one parent had hypertension or had normal blood pressure but was a hyperreactor to the cold pressor test and the other had normal blood pressure and was a normal reactor, 43.4 per cent of the children were hyperreactors to the cold pressor test. If both parents had hypertension or were hyperreacting normals, 95 per cent of the children were hyperreactors. Hines⁸ pointed out that the incidence of hypertension twenty years after the first admission to the Mayo Clinic in a group of patients who had a positive family history of hypertensive disease was almost the same as the incidence of children who were hyperreactors to the cold pressor test in families in which one parent was a hyperreactor or had hypertension. Furthermore, of the 1,374 patients, 58 stated at the time of the original examination that both parents had hypertension; of these, 52, or 89.6 per cent, had hypertension ten or twenty years later. Briggs and Oerting⁶ confirmed these findings in a study of 233 patients receiving prenatal care and subsequent application of the cold pressor test to the offspring.

Following the technic of Hines and Brown, Randall, Murray and Mussey,⁷ at the Mayo Clinic, determined the reaction in 104 pregnant women. No definite conclusions were drawn from this study, but since its publication other obstetricians have used the cold pressor test as a basis for prediction of subsequent toxemia. Dieckmann and co-workers^{8,9} believe that the test is of value, as does Bak,¹⁰ but the results of the work of Reid and Teel¹¹ fail to support the suggestion that the test might reveal impending toxemia. Chesley and Chesley¹² made a detailed report of the reactions of 539 pregnant patients who were subjected to the cold pressor test. They followed the exact technic as outlined by Hines and Brown and all of the tests were performed by one individual. Statistical studies of the data indicated the response to be independent of family history, of cardiovascular-renal disease, of age, gravidity, weight, weight-height index, weight gain in pregnancy, and "perhaps also of the basal blood pressure."

Up to 1940 Hines¹³ had applied the cold pressor test or it had been applied under his direction approximately 5,000 times to 1,856 persons. Of these, 1,015 had normal blood pressure and 841 had essential hypertension. Hyporeactors in the group with normal pressure showed an average rise in systolic pressure of 12.4 mm., and 10.1 in diastolic pressure. Hyperreactors had an average systolic rise of 31.2 mm., diastolic 27.5. The patients with essential hypertension showed an average rise of 46.6 mm. in the systolic and 30.9 mm. in the diastolic pressure. Heins¹⁴ noted that the reaction of the diastolic pressure was much greater in children than in adults.

Pickering and Kissin¹⁵ studied a group of patients

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with blood pressures over 150 systolic and 95 diastolic after rest in bed for several days. All had some cardiac enlargement but none had congestive heart failure. In carrying out the cold pressor test on these subjects, the technic of Hines and Brown was followed except the hand was immersed in water at 4° Centigrade for three minutes instead of one minute. The response was very variable and these authors could not confirm the findings of Hines and Brown.

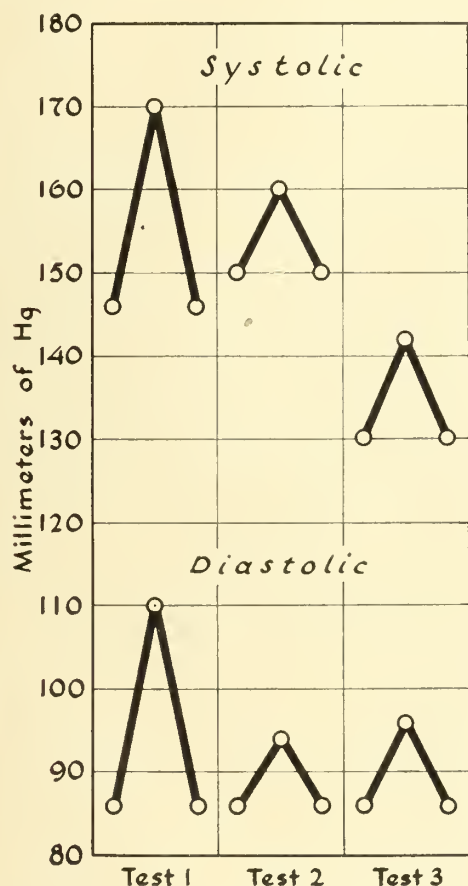


Fig. 1. Response to repeated cold pressor tests at 24 hour intervals.

Feldt and Wenstrand¹⁶ compared the results of the cold pressor and the breath-holding tests in 200 individuals. The responses were not remarkably similar. These authors¹⁷ also carried out the cold pressor test in 350 persons with normal blood pressure. Of these, 27.4 per cent had a family history of hypertension and 29.7 per cent were hyperreactors to the test, but there was no correlation between family history and pressure rise. Feldt and Wenstrand followed the method of Hines and Brown throughout both studies.

In the present study, the test was applied to 88 university students aged between sixteen and forty-eight years, who were selected so that 30 had systolic pressures ranging from 102 to 138 mm. Hg., and diastolic pressures between 60 and 88 mm. Hg. There were 54 with pressures above and 4 with pressures below these ranges.

It was the purpose to: (1) correlate the cold pressor responses to *a*) blood pressure levels, and *b*) a family history of hypertension or stroke and (2) to determine whether the responses were sufficiently constant to serve in predicting the future development of hypertension. The technic described in 1939 as outlined by Hines and Brown was used. The blood pressure readings conform to the standards as recommended by the American Heart Association¹⁸ and the same mercury sphygmomanometer was used throughout the series of tests. The same thermometer was used to test the temperature of the water in all instances. Only one individual performed the tests, and there was never a third person in the room at the time of the testing. Thus, an effort was made to remove outside influences and variations in method which might bring about differences in response. The procedure was explained to the subject at the beginning of the rest period and the findings were not discussed at any time during the test. The pulse rate was taken at the beginning and again at the end of the rest period and immediately upon the immersion of the hand in ice water.

The responses to the test are shown in Table 1. The basal systolic pressure range was 90 to 164 mm. Hg., the diastolic 40 to 112 mm. The height-weight percentages varied from 84 to 148 per cent of the standard for age and sex.

The degree of cold pressor response as compared with previous blood pressure readings is shown in Table 2. Reference to Table 1 brings out the fact that the average rise in systolic pressure when the test is applied is 10.9 mm. Hg. The mean response for persons with normal pressure (systolic between 100 and 138 mm. Hg., diastolic between 60 and 88 mm. Hg.) and that for individuals with hypertension is practically the same. The four subjects with low blood pressure had a slightly lower average response and a narrower range. In Table 3, the groupings are made on basal blood pressure readings. The mean responses to application of the test in the hypertensive group are slightly higher, but, certainly, such small differences in mean response are not clinically significant. They are all within the limits of error in determination of the blood pressure as well as within the

TABLE 1
Response to the Cold Pressor Test

	Range of Response	Mean Response	Standard Deviation	Coefficient of Variation
Rise in systolic pressure	0-38 mm.	10.9 mm.	6.9 mm.	63.3%
Rise in diastolic pressure	2-34 mm.	11.6 mm.	7.0 mm.	60.3%

TABLE 2
Comparison of Cold Pressor Response with Previous Blood Pressure Readings

Previous Blood Pressure	No. of Subjects	Rise in	Range of Response	Mean Response
Normal 100-138 systolic 60-88 diastolic	30	Systolic Diastolic	0-22 4-26	10.2 mm. 11.4 mm.
Low Below 100 systolic and 60 diastolic	4	Systolic Diastolic	4-10 4-16	6.5 mm. 9.0 mm.
High 140 and over systolic; 90 and over diastolic	54	Systolic Diastolic	0-38 0-34	11.5 mm. 11.9 mm.

TABLE 3
Comparison of Cold Pressor Response with Basal Blood Pressure Readings

Basal Blood Pressure	No. of Subjects	Rise in	Range of Response	Mean Response
Systolic: 102-138 mm. Hg.	44	Systolic	0.38	10.0 mm.
Diastolic: 60-88 mm. Hg.		Diastolic	2-28	10.7 mm.
Systolic: Under 102 mm. Hg.	6	Systolic	4-12	8.3 mm.
Diastolic: Under 60 mm. Hg.		Diastolic	4-16	9.3 mm.
Systolic: 140 mm. Hg. and over	38	Systolic	0-30	12.3 mm.
Diastolic: 90 mm. Hg. and over		Diastolic	2-34	13.1 mm.

TABLE 4
Comparison of Response with Family History of Hypertension or Stroke

Family History	No.	Systolic Pressure Response		Diastolic Pressure Response	
		Mean Rise	Standard Deviation	Mean Rise	Standard Deviation
Presence of hypertension or stroke, or both	42	10.1±S.E. 1.009	6.538	12.4±S.E. 1.153	7.473
No hypertension or stroke	42	12.1±S.E. 1.107	7.176	11.2±S.E. 1.035	6.705

range of variability of successive blood pressure readings.

Although the group is small and this report is of preliminary nature, it is evident that no relation exists between a family history of hypertension or stroke and the response to the application of cold (Table 4). In fact the mean response of the two groups is practically the same when a small sample statistical method is applied. If the cold pressor response is to correlate with the family history of hypertension as indicated in the data of Hines and Brown, and if the test is to be of clinical value, it should be evident in a group of eighty-eight tests. No relationship could be demonstrated between pressure rise and age, height-weight per cent, or nationality.

Approximately three months after the first experiment the entire group was sent notices to return for another test. Of these, ten persons selected at random were given the second test with the same procedure as the first except the hand was immersed in water at 33° Centigrade instead of 4° Centigrade. The subject was told merely that the cold pressor test was to be repeated. No explanation regarding the change in temperature of the water was made. Since the normal temperature of the skin of the hand is approximately 33° Centigrade, that temperature was chosen in order to eliminate effect of the cold and to allow measurement of the blood pressure response to emotion stimulated by the memory of the cold experienced during the first test.

Thirteen subjects were given the repeat test exactly as the first had been given, the temperature of the water being 4° Centigrade. Results for these two groups are shown in Table 5. The mean systolic and diastolic rises to the first test for both groups were higher than the mean for the total number of subjects. It can be concluded, however, that the rises in blood pressure when the hand was immersed in water at 33° Centigrade were due to the anticipation of cold. The range of response was 0 to 16 mm. both in the systolic and the diastolic pressure, no rises being recorded for only two individuals.

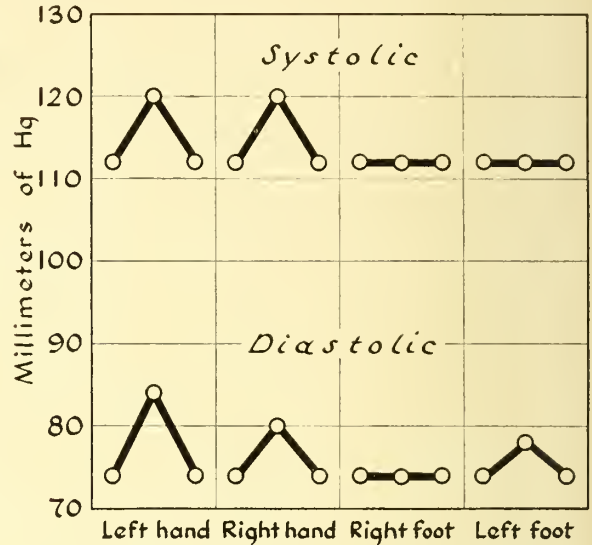


Fig. 2. The effect of transection of spinal cord on cold pressor response when each of the four extremities is immersed in water at 4° C.

In all instances, the rise was less than it had been for the first test and the pressure returned to basal level within one minute after the 60 second reading.

The responses to the second test with the water at 4° Centigrade in most cases are lower than the first responses; however, no constancy of result was noted. The systolic response was lower in seven instances, higher in

TABLE 5
Results of Repeated Cold Pressor Tests

Group	No. of Cases	Mean rise in Pressure	
		Systolic	Diastolic
Group I:			
1st Test (water at 4° C.)	10	15.6 mm.	13.0 mm.
2nd Test (water at 33° C.)		5.0 mm.	7.0 mm.
Group II:			
1st Test (water at 4° C.)	13	15.85 mm.	17.08 mm.
2nd Test (water at 34° C.)		12.92 mm.	12.62 mm.

five, and the same in one; whereas the diastolic response was lower in ten subjects and higher in three. Repeated daily tests for three days in the same individual at the same time of day illustrates this finding. (Figure 1).

A patient whose spinal cord had been transected at the level of the twelfth thoracic vertebra in a fall in April, 1942, was studied. The subject, a female, was 19 years old at the time of the accident. The cold pressor test was applied to each of the four extremities (see Figure 2). The blood pressure rose when either hand was immersed in ice water but there was practically no change when a foot was placed in the cold water. The results are consistent with the findings of Sullivan,¹⁹ who studied cold pressor responses in the upper and lower extremities of a patient with a spinal cord transection syndrome. These studies tend to substantiate the assumption that the reaction is due to the sudden stimulation of the cutaneous nerves of temperature and pain.

SUMMARY

1. In a group of 88 university students, responses to application of the cold pressor test were not significantly

greater in persons with hypertension than in subjects with normal blood pressure.

2. No relationship between a family history of hypertension or stroke and response to the cold pressor test could be demonstrated. Also, no relation between pressure rise and height-weight index, age, or nationality was evident.

3. Repeated tests failed to elicit constant responses. In fact, second tests often yielded smaller pressure rises than the first.

4. The blood pressure rises when the hand is immersed in tepid water if the subject expects the water to be cold.

5. A review of the literature concerning the cold pressor test indicates that the mechanism is a vasopressor reflex reaction due to stimulation of the cutaneous nerves of temperature and pain. The study of a subject with transection of the spinal cord at the level of the twelfth thoracic vertebra tends to support this conclusion.

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Clinical Studies of Influenza Epidemic*

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I HAVE chosen to limit my discussion to the clinical characteristics of an outbreak of an acute febrile disease with generalized symptoms, without local physical findings, and without complications, which occurred and spread with explosive rapidity among the members of two companies of the A.S.T. Unit (4759) at St. Louis University in November, 1943. This disease first appeared in epidemic proportions on November 12, 1943, in Company A and on November 14, in Company B. It reached its peak in Company A between November 12 and 14 and in Company B, twenty-four to forty-eight hours later, on November 14 and 15. The incidence of cases declined rapidly thereafter and by November 20 the disease had completely vanished from both companies.

To understand any epidemic it is necessary to acquire the pertinent facts about the affected group, as to their origin, their relationships and contacts both among themselves and with the population generally and locally, as well as any disease factors inherent in the group itself, the community and the nation.

The two companies, A and B, with which this discussion is concerned were organized in the latter part of July, 1943. Their personnel were selected by army classification boards from men who had been in service from a few months to two years in camps widely scattered throughout the country; their homes were equally widely distributed.

These two companies were quartered and fed as a unit isolated from the rest of the A.S.T. Unit personnel. Class schedules, study periods, military drill, and physical education activities were so arranged that it was virtually impossible for members of these two companies to have more than very casual contact with civilian students and other civilians except on Saturday nights and Sundays. They were quartered in barracks fashion in six buildings in an area approximately one block square in mid-town St. Louis. These buildings were numbered for military purposes from 1 to 6. Buildings 1, 2, and 3 were occupied exclusively by Company A, Buildings 5 and 6 by Company B, and Building 4 was shared by the two companies. Buildings 1 and 4 were university buildings with large rooms, accommodating 10 men in the smallest, and 50 men in the largest, the rest varying be-

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	Both Companies	Co. A	BUILDING No. 1						BUILDING No. 2			BUILDING No. 3		BUILDING No. 4		
			By Bldg.	Distribution by Classes					By Bldg.	By Classes		By Bldg.	By Classes	By Bldg.	By Classes	
				1 A	5 A	5 B	5 C (Germ.)	5 C (Ital.)		1 B	1 C		1 D		1 A	
Total men	508	268	122	10	33	45	17	17	80	40	40	36	36	30	30	
Total cases	132	64	29	4	6	10	2	7	15	12	3	14	14	6	6	
Per Cent	25.9%	23.8%	23.7%	.....	18.1%	22.2%	11.7%	41.1%	18.7%	30.0%	7.5%	38.8%	38.8%	20.0%	20.0%
Date	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	
Nov. 9	1															
Nov. 10	1	1	1		1											
Nov. 11	0															
Nov. 12	32	25	16		3	7	2	4				7	7	2	2	
Nov. 13	6	5	4		1	1		2	1	1						
Nov. 14	36	14	7	4			2					5	5	2	2	
					Medical Inspections Started at This Point											
Nov. 15	33	7	1		1				5	4	1	1	1			
Nov. 16	14	5							4	3	1			1	1	
Nov. 17	1	1							1	1						
Nov. 18	6	4							3	3				1	1	
Nov. 19	1	1							1		1					
Nov. 20	1	1										1	1			
	132	64	29	4	6	10	2	7	15	12	3	14	14	6	6	

tween 20 and 40 men per room. The other four buildings were dwellings whose rooms could accommodate 2 to 12 men as the extremes, the average being 4 to 6 men per room. The beds were all double-deckers with head and foot alternated from bed to bed and above and below. Both companies messed together in a common diningroom served by a single kitchen, both of which were located in Building 4.

There were seven class groups in each company. Each class group had its own individual class schedule and therefore no one group mingled with any other group in classes. Housing in general was by class groups or multiples of class groups. And in all buildings except in Building 1, class groups were separated from each other to some degree by being assigned to certain sections of the building. Building 1 housed 122 men, comprised of four and one-fourth class groups. These were all intermingled in four large rooms. The remaining three-fourths of the fifth class (30 men) were housed in Building 4. Building 2 housed two complete class groups, one on the first floor, and one on the second floor, a total of 88 men. Building 3 housed one complete class group. Building 4 housed two class groups and two-thirds of a third (the remaining one-third of which was in Building 5) as well as the previously mentioned class group which was split between Buildings 1 and 4. Building 5 housed two class groups and the one-third of a class group referred to above. Building 6 housed two class groups. Such, in general, were the class, group, building, and housing relationships.

In general, the inherent health of personnel throughout the summer and fall had been good. However, on the week ending August 28 we had reported 3 cases of

influenza to the Surgeon General's office from Companies A and B. And on each succeeding week thereafter we reported from 1 to 5 such cases up to and including the week ending on October 30. We chose to call them influenza because of the clinical picture they presented (a picture identical with the epidemic cases we will presently describe) and because they did not seem to fit any other diagnostic term we knew.

From October 31, to November 7, the members of Companies A and B were given furloughs and promptly departed for points in all directions and as far distant as the Atlantic Coast, Pacific Coast, the Canadian border, the Gulf Coast, and many points in between these extremes. The furloughs ended on November 7, and the personnel of both companies had returned for duty by the night of that date.

On the morning of the 9th of November a man from Company B quartered in Building 6 reported to sick call with the clinical picture of what we had in the preceding ten weeks been dubiously diagnosing as influenza. He had gone to his home in San Diego, California, on his furlough. He had gone by train by way of Kansas City and Los Angeles, over the Missouri Pacific to Kansas City and the Santa Fe from Kansas City to San Diego by way of Los Angeles. He had not stopped over at any towns enroute. He had not attended any large gatherings either public or private while away from St. Louis. He was not aware of any epidemics existing in his home neighborhood in San Diego and none of his family or friends with whom he visited were known to be ill. He also stated he did not associate with anyone nor did he notice anyone on the train whom he judged to be sick either enroute to or returning from San Diego. He was

Co. B	BUILDING No. 4						BUILDING No. 5						BUILDING No. 6			
	By Bldg.	By Classes					By Bldg.	By Classes					By Bldg.	By Classes		
		3 A	2 C	2 D	2 E	2 F		3 A	2 B	2 C	2 D	2 F		3 A	2 A	2 B
242	87	14	1	1	36	35	81	4	1	38	36	2	74	1	37	36
68	16	4	0	1	5	6	36	1	1	16	18	0	16	0	9	7
28.0%	18.3%	26.3%	.....	.....	13.8%	16.6%	44.4%	.....	.....	41.0%	49.1%	.....	21.6%	.....	24.3%	21.6%
No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases	No. Cases
1													1		1	
7	3	1			2		4		1	1	2					
1	1	1														
22	3	1		1		1	15	1		7	7		4		4	
Medical Inspections Started at This Point																
26	6	1			2	3	14			6	8		6		2	4
9	2				1	1	3			2	1		4		2	2
2	1					1							1			1
68	16	4	0	1	5	6	36	1	1	16	18	0	16	0	9	7

promptly hospitalized on the morning of November 9.

On the morning of November 10, a man from Company A, quartered in Building 1, reported to sick call with a similar clinical picture. He had gone to his home in Albany, New York, on his furlough. He had traveled over the Penn Railroad to Atlantic City where he had visited a friend for a few hours. From Atlantic City he had traveled over the New York Central by way of New York City to Albany. He had returned to St. Louis over the New York Central directly to St. Louis. He, too, was unaware of having associated with or been in contact with anyone who was ill either in Atlantic City, Albany, or on the trains.

On November 12, 32 cases of this disease reported to Student Health Service throughout the day. All were hospitalized or isolated. Twenty-five of the 32 cases were from Company A (16 in Building 1, 7 in Building 3, and 2 in Building 4). The remaining 7 cases were in Company B (3 in Building 4, and 4 in Building 5). This preponderance of cases in Company A and particularly in Buildings 1 and 3 made us feel that the spread of the disease would be from within Company A, and probably in Buildings 1 and 3. With the hope that we might restrict this spread of the disease to one company and possibly to these two buildings in Company A, we quarantined Company A on the night of November 12, and requested that all classes, physical education, swimming, and drill be suspended for that company, that the personnel be restricted to their quarters, and that separate mess lines be organized for the two companies, Company A to follow Company B in the mess hall.

The number of cases reporting to sick call on November 13 was only 6—5 from Company A (4 from Build-

ing 1, and 1 from Building 2, the first case from this building) and 1 case in Company B, Building 4. This made us hopeful that our restrictions might be successful. These hopes were still bright up until noon of November 14. But on the afternoon of November 14, we were completely disillusioned. For from noon until 9 P. M. that day we received 36 cases, 14 from Company A and 22 from Company B. Of the Company A cases, 7 were from Building 1, 5 from Building 3 (the two original foci) and 2 from Building 4. Of the Company B cases, 3 were from Building 4, 15 from Building 5, and 4 from Building 6. Building 2 was now the only building which remained free, only 1 case having reported from there on the preceding day.

These incidences of 32 cases, 6 cases and 36 cases on three successive days and the rapid spread in both companies made us suspect that we were dealing with a disease of a very short incubation period, probably between twenty-four and forty-eight hours. This, and the fact that the disease had appeared in relatively large numbers in five of the six buildings, made us feel that speed in segregating new cases would probably be the only effective method by which we could restrict the spread of the disease. With this in mind, all activities in both companies were suspended and the men were restricted to their respective companies and building areas. We instituted medical inspections for the two companies twice daily from November 15 to November 22. This consisted of taking temperatures, observing the men and questioning them as to their well being. All men with fever, or who felt ill were either hospitalized or isolated for further observation. Mess lines were organized by buildings in order of the number of cases already discovered in each,

the one with the least number of cases going first and the one with the most, last. Guards were posted to keep personnel housed in one building from visiting in other buildings. This program was followed throughout the rest of the epidemic. Whether all these measures were helpful or not might be open to question. We feel, however, that the medical inspections were helpful in limiting the spread of the disease. Under this regime on the following day, November 15, a large number of cases, 33, were "discovered," as was to have been expected, and hospitalized. Seven were from Company A (1 each from Buildings 1 and 3, and 5 from Building 2). Twenty-six were from Company B (6 each from Buildings 4 and 6, and 14 from Building 5). This was definitely a waning in Company A, a spread in Company B as compared to the previous day, and an increase in those buildings previously relatively free from the disease. It also marked the beginning of the end of the epidemic for thereafter the number of cases discovered daily rapidly and steadily decreased.

On November 16, 14 cases were found, 5 from Company A (4 from Building 2, and 1 from Building 4), 9 from Company B (2 from Building 4, 3 from Building 5, 4 from Building 6).

On November 17, 1 case from Company A (Building 2).

On November 18, 6 cases, 4 from Company A (3 from Building 2, and 1 from Building 4), 2 from Company B (1 each from Buildings 4 and 6).

On November 19, 1 case from Company A (Building 2).

On November 20, 1 case from Company A (Building 3).

None on November 21 and thereafter.

Clinically the disease was characterized by a dearth of physical findings and only generalized symptomatology. The onset was sudden. The patients were often unable to give any definite symptoms. Frequently their only complaint was that they "didn't feel well." The usual symptoms were malaise, mild chilly sensations, mild generalized aching and nothing more. A few cases (5 in 132) had vague and fleeting abdominal discomfort. The temperature range was from 99° to 104° (usually 101° to 102°). The conjunctivae were slightly injected, the face was flushed. There was no redness of the mucous membranes of the nose and throat. The lungs were negative. Toward the end of the febrile stage of the disease most of the cases did develop a very slight cough without any physical findings in the chest. Prostration was present but not severe. The appearance of the patient was not in keeping with the fever. They did not look as sick as their fever would lead one to believe they should. It was disconcerting after observing and questioning one of these boys to conclude in one's mind that his fever would not be high and then to find it was 103° or 104°. The WBC was low in the majority of cases; occasionally normal or slightly elevated.

The course of the disease was very undramatic. The fever usually lasted about four days. A mild secondary rise in temperature usually occurred after one to three days of normal temperature. This secondary fever curve

was seldom higher than 99° or 100° and lasted only one or two days. In a few cases it continued sporadically for as much as a week. The average period of hospitalization was 5.8 days. The severity and duration of the disease were both reduced by early bed rest. Two-thirds of the cases in Company A and one-half of those in Company B reported voluntarily before medical inspections were instituted on November 15. These cases were more severely ill and were sick longer, than those discovered on November 15 and succeeding days. These later "discovered" cases often protested that they were not sick when found to have a fever of 100° to 101°. This caused us to feel that the febrile reaction possibly antedated symptomatology by about twenty-four hours.

There were no complications and only one mild relapse. The treatment was essentially bed rest and symptomatic. The sulfa drugs were not used.

The cases were discharged from the hospital after they had been afebrile for twenty-four to forty-eight hours and were held in four temporary convalescent wards in Building 4 until they had been completely afebrile for four or five days. These wards were segregated and guarded. In two instances well soldiers managed to elude the guards and entered these wards to visit their friends. In both cases the intruders were sick within thirty-six hours and had typical cases of the disease. This was suggestive but not conclusive evidence that infectiousness lasted for three or four days after the major fever phase of the disease had subsided.

We were also impressed with the epidemiological importance of the mild or subclinical cases of the disease. After the medical inspections were started we found a number of cases with no symptoms, and slight fever of 98.8° or 99°. These were isolated in an isolation ward that was established in Building 1. Some of them developed typical but mild symptoms of the disease without any further rise in temperature and often with a normal temperature after the first twelve or twenty-four hours. A few never developed any symptoms and a few developed mild febrile states similar in duration to the typical cases but with very transient or no symptoms. These cases we chose to call "sub-clinical" cases. From the viewpoint of medical care they were not important but from the epidemiological viewpoint they were of the utmost importance because they were probably just as infectious as those who were really ill and more readily detectable, and yet they were not sick enough to seek medical attention voluntarily. They in our opinion were more epidemically dangerous than the others because they were much more difficult to discover. This was particularly so in individuals who did not wish to be hospitalized and sought to conceal their symptoms.

There was a total of 132 cases among 508 men, an incidence of 25.9 per cent for both companies; in Company A (64 among 268) 23.8 per cent; in Company B (68 among 242) 28.0 per cent.

The incidence by buildings showed a variation of from 18 to 44 per cent. Building 1 (29 cases among 122) 23.7 per cent. Building 2 (15 among 80) 18.7 per cent. Building 3 (14 among 36) 38.8 per cent. Building 4 (16 among 87) 18.3 per cent. Building 5 (36 among

81) 44.4 per cent. Building 6 (16 among 74) 21.6 per cent.

Floor plans of all buildings showing the location of the beds of those men who were ill and the date they became ill, were made and studied for evidence of a spread from bed to bed. The results were disappointing in that no general correlation could be found for the spread of the disease by reason of the proximity of the beds of those afflicted. In a few cases it seemed significant.

The incidence by class groups was from 7.5 per cent to 49.1 per cent, a greater variation than was found by buildings. This would seem therefore to be more fundamental than the building percentages. For it will be recalled that each building housed one to four class groups. The building percentages would therefore be merely composites of the class incidences. But a comparison of class incidences and building incidences showed this to be true in some cases and not in others.

Class	No. Enrolled	No. Cases	Building	Per Cent
5C (Germ.)	17	2	1	11.7
5A	33	6	1	18.1
5B	45	10	1	22.2
1A	40	10	1&4	25.0
5C (Ital.)	17	7	1	41.1
1B	40	12	2	30.0
1C	40	3	2	7.5
1D	36	14	3	38.8
2E	36	5	4	13.8
2F	37	6	4	16.2
3A	19	5	4&5	26.3
2C	39	16	5	41.0
2D	37	19	5	49.1
2B	37	8	6	21.6
2A	37	9	6	24.3

In Buildings 1 and 2 the disease seems to have spread primarily by class groups, for the class incidences ranged from 11 to 41 per cent. And the same seems to be true in Building 2 where the class incidences were respectively 7.5 per cent and 30 per cent for the two classes housed in

that building. In Buildings 5 and 6, however, the reverse seems to be true for the class incidences very closely parallel those for the building. In Building 4 again class incidences seemed to be most significant. It was our opinion then that the spread of the disease was primarily by class groups, secondarily influenced by building associations and contacts.

SUMMARY

We have presented the clinical history of an epidemic of 132 cases of an acute febrile disease clinically believed to be influenza, occurring in a group of 508 A.S.T. Unit soldiers which we believe to have spread primarily by class groups and secondarily through building associations and contacts.

The disease was highly infectious, with an incidence of as high as 49.1 per cent in one class group and 44.4 per cent in one building. Infectiousness persisted in the postfebrile period for about three days.

The incubation period was short, probably between twenty-four and forty-eight hours, permitting the disease to spread rapidly through the two companies affected.

The disease had a four-day febrile course without local signs, local symptoms, or complications.

Because of the short incubation period, the high degree of infectiousness, the freedom from symptoms during the early invasion period, and the presence of "subclinical" cases, the most effective method of control seemed to be "case finding" inspections twice daily.

The duration of the disease and the degree of illness were effectively lessened by early discovery and prompt bed rest. No other form of treatment seemed to have any effect on the course of the disease. The sulfa drugs were not tried.

We believe the spread of the disease may have been by "subclinical" cases which were discovered effectively only by "case finding" inspections.

HELP FOR RUSSIA'S LIBRARIES

Russia's hospitals and medical libraries—many of them completely devastated in the process of war—have appealed to the hospitals of this country through the American Hospital Association for assistance in their great program of reconstruction. Medical institutions have lost vast quantities of material, much of it irreplaceable. They are asking that we help to restock the medical libraries and for all the detailed information possible regarding our hospitals in the form of reprints, articles, blueprints, and books.

HELP FOR AMERICAN PRISONERS

On the basis of recommendations by medical officers repatriated from German prison camps and hospitals, the American Red Cross has sent 5,000 tubes of penicillin by air express to the International Red Cross Committee in Geneva to be used for American prisoners of war held by Germany.

Recent Advances in the Isolation and Identification of the Influenza Virus

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INFLUENZA has been a subject of special interest since the pandemic of the years 1917-18. This interest has been heightened by the present war. During the last great pandemic a determined effort was made to find the etiological agent but no general agreement was reached, and the disease was left where it had been placed by Pfeiffer, when he discovered and attributed etiological importance to the influenza bacillus. Since the end of that pandemic, however, great progress has been made in the study of influenza. The etiology has been quite definitely established and appropriate laboratory methods for diagnosis are rapidly being developed.

Pfeiffer¹ found and described the haemophilus influenza bacillus in 1892 during an outbreak of an acute respiratory disease. He as well as others did considerable work with this organism but it was never widely accepted as the true etiological agent. It was often found in the nose and throat washings, and even in the lung tissues at autopsies of patients suffering from influenza, but it was often absent from the washings and tissues of other typical cases. It has always been difficult, or impossible, to produce typical influenza in animals and human volunteers with this organism.

In 1932 Shope² working with influenza of swine succeeded in demonstrating the symbiotic action of Pfeiffer bacillus and a virus in these animals. He showed that the virus alone or the bacillus alone did not produce the characteristic picture of swine influenza but that the two together did produce such a typical disease.

These findings tended to crystallize the opinions that had been prevalent for some time, namely, that influenza was in some way associated with a virus. Smith, Laidlaw and Andrews,³ however, were the first to isolate a virus from the throat washings of a human suffering from the disease. They did this by instilling the throat washings of patients intranasally into ferrets. They were able to propagate the virus by serial transplants and to keep the virus growing indefinitely. They also showed that after many transplants through ferrets of material from infected ferret lungs, that the virus could be made pathogenic for mice.

The work of these investigators was confirmed by Francis⁴ and others and it was shown that during epidemics of influenza the virus could regularly be isolated from a considerable number of the throat washings of patients by means of the ferret technic.⁵ It was also shown that the virus was difficult to isolate from sporadic cases of influenza, even though these cases were shown to be cases of influenza by an increase in the antibody titre of their serum. It has been shown that the disease is caused by a virus; that the virus can be made to

propagate under suitable circumstances and that the virus so grown, will infect humans.⁶ The ferret technic is at best cumbersome and expensive and does not lend itself well to routine investigation. The next forward step came with the demonstration by Burnett and others that the virus can be made to grow in the amniotic sac of a chick embryo. It was later shown that the virus would also grow well on the chorio-allantoic membrane of the chick embryo. It was further shown that the chick embryo can be used for primary recovery of the virus from the filtered throat washings of human cases. With these facilities numerous studies of small epidemics have been made and it has been shown that there are at least two types of influenza virus, Type A and Type B, and that possibly other types exist.

In 1941 Hirst⁷ made a very interesting observation, namely that the allantoic fluid of infected chick embryos has the ability to agglutinate the red blood cells of chickens. He developed this observation to the point where it is now used as a method for demonstrating the presence of influenza virus in allantoic and amniotic fluid. He has further shown that the method can, by appropriate technics, be used for the influenza virus neutralization test. The Hirst tests are now widely used by investigators in the field and are very satisfactory. There has been another development which though quite recent, is of great importance; this is the observation by Thigpen and Crowley,⁸ that unfiltered throat washings can be inoculated directly into chick embryos and that the virus, if present, will "grow out" despite the presence of contaminating bacteria. This finding is very significant first, because it simplifies and speeds up primary inoculation and hence hastens recovery of the virus, and second, because it obviates filtration of the throat washings through bacteria retaining filters, a step which, heretofore, has been a great disadvantage since it frequently resulted in the removal of virus as well as the bacteria from the throat washings.

Because of these various advances, there are now at hand the necessary tools for a rapid evaluation of epidemics of influenza. Thus, when in the latter part of November 1943, a large number of cases of influenza appeared in St. Louis, Missouri, we were able to institute studies directed toward recovery and identification of the virus in this outbreak.

All the cases included in this study were hospitalized in the St. Mary's Group of Hospitals of St. Louis University. The majority were students in the university and were seen through the kindness of the St. Louis University Student Health Service, the rest of the cases occurred in the general population.

Each patient who was diagnosed clinically as having influenza and who had a fever of more than 100° F.

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was used to secure throat washings and blood for serum—the blood was obtained every five days for fifteen days. The throat washings were transferred to a plastic container and frozen in dry ice until used. The serum was used to study the development of antibodies. It has been shown that virus kept at extremely low temperature, will maintain its virulence for long periods of time while the antibodies in the serum can be kept at ordinary refrigerator temperature. Virus isolation was carried out as follows:

White leghorn eggs were incubated for twelve days and 0.1 cc. of unfiltered throat washings from each patient was injected into each of six eggs. The material was injected into the chorio-allantoic membrane of the egg. A small opening was made over the air sack and the material injected. The opening was sealed with paraffin and the eggs incubated for another forty hours.

At the end of this period the allantoic fluid was secured. From 3 to 8 cc. of fluid can be secured. When isolation of virus is being attempted, it is well to pool some of the material from each egg and immediately inoculate another series of eggs; such serial transplants should be repeated five times before the material is discarded.

Testing for significant amounts of virus in the recovered allantoic fluid is relatively easy with the Hirst technic. It consists of mixing 1 cc. of 3 per cent adult chicken cells and 1 cc. of the allantoic fluid. The mixture is allowed to stand for one hour and 15 minutes, and then observed for agglutination; if virus is present the cells will be agglutinated. If virus is shown to be present, titre can be determined by setting up the test using serial dilutions of the amniotic fluid.

In order to identify the virus recovered, it is necessary to have available antisera of influenza, type A and type B. The serum used in these studies was supplied through the courtesy of Dr. E. Rickard of the Minnesota Influenza Laboratory. They were potent human convalescent sera. The test is done by mixing the antisera, allantoic fluid to be tested and saline in equal amounts, usually $\frac{1}{2}$ cc. The test is run using serial dilutions of the antisera and is set up as described above for the determination of the presence of virus. Again the test is observed for one hour and 15 minutes; this time, however, the agglutination indicates that the antiserum was not effective in neutralizing the virus; therefore, the virus could

not be of that type, in other words, if the allantoic fluid contains influenza virus type A, no agglutination will occur in the tubes which contain antisera type A, while agglutination will occur in the tubes which contain type B.

It is well known that individuals who suffer from influenza develop antibodies in their circulating blood; by following the increasing titre of these antibodies, one can secure good evidence that the patient has had the disease. The absence of such a rise would be a point against the diagnosis. For the purpose of such a demonstration, the Hirst test can again be used, only this time known virus must be used. In our studies, we used the PR8 strain of type A and the Lee strain of type B. The test is set up exactly as for identification of virus above, but known virus is substituted for the known serum described above. It is evident that as the patient develops antibodies against the virus, he will show an increasing ability to protect against one or the other of the virus strains.

CONCLUSION

It is possible by a relatively simple technic, to isolate and identify the influenza virus from the throat washings of patients during an epidemic. The antibody titres of patients and contacts can be followed easily. In the recent outbreak of influenza in St. Louis, Missouri, influenza virus, type A, was recovered from 64 per cent of the throat washings tested. A significant increase in the antibody titre against influenza virus, type A, was also shown in the blood of those cases which were tested.

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JOURNAL-LANCET LECTURESHIP

The Fourth Annual JOURNAL-LANCET Lecture was delivered by Brigadier General James S. Simmons, U. S. Army, Chief of Preventive Medicine Service, Army Service Forces, Office of the Surgeon General, on Thursday evening, December 7. The subject of the address, "Recent Advances in the Control of Insect-Borne Diseases," was of great interest to the doctors in attendance, including the members of the Hennepin County and Ramsey County medical associations, there by invitation. This lectureship is sponsored by the Medical School of the University of Minnesota. The speech was made at the auditorium of the Museum of Natural History at that institution. Many of the Medical School faculty were in the audience. A complimentary dinner preceded the lecture. Previous speakers in the Lectureship series: Dr. René Dubois, Rockefeller Foundation, Dr. Harold Cox, then of U. S. Health Service, now affiliated with Lederle Laboratories; Dr. Ernst Gellhorn, at that time of University of Illinois faculty, now University of Minnesota. The address will be reported fully in subsequent issues of JOURNAL-LANCET.

The Relief of Hypertension by Mechano-Therapy

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HYPERTENSION, with its sequelae, is recognized as one of the prime causative agents of mortality in adult life. Recent investigations have offered some new concepts of the physiologic mechanisms that initiate hypertension as well as new therapeutic procedures of prophylactic value. However, except for general measures and a few specific measures for certain forms of hypertension, the treatment for most cases of hypertension has been unsatisfactory.

The accepted concept of hypertension today places the upper normal limits of systolic pressure at 140 and the diastolic pressure at 90. However, the conditions I have treated by mechano-therapy have been particularly the more advanced forms of hypertension that have resisted all forms of other known therapy and where the systolic pressure was 180 or more and the diastolic was well over 100. Before discussing the method and results of my experiences, I shall briefly summarize the latest concepts of etiology and pathology of hypertension and add the anatomical and physiological data upon which I initiated and based my mechano-therapy.

ETIOLOGY

The percentage of hypertension in which a definite etiology is known is very small and may be classified into several major groups: Renal, endocrine (including pheochromocytomas), toxemias (including eclampsia), vascular lesions, and diseases of the central nervous system. Once the cause is ascertained to be one of these, it may at times be entirely and spectacularly removed and the patient apparently cured. This is particularly spectacular in the case of surgery of the renal and endocrine type, for example by the operative removal of a pheochromocytoma. However, when the cause is not known, and the treatment is unsatisfactory, the etiology has been ascribed to a "hypothetical noxious substance" in the circulation, which causes a spastic condition of the arterial tree in a "hypothetical vulnerable vascular system." It has also been ascribed to heredity, and Julius Bauer states that essential hypertension is a clinical entity, and describes the etiological factor as an abnormal gene or gene complex which extends its activity on all organs involved in the maintenance of blood pressure. At any rate, it is quite usually acceptable that the management of essential hypertension requires consideration of the whole personality as a psychosomatic unit, rather than treatment of special organs.

PATHOLOGY

Pathologically, the early findings of hypertension often vary considerably. These pathologic changes can be reasonably explained in accord with present knowledge as resulting directly from the mechanical effects of persistent elevated tension on the vascular tree, producing two distinct types of vessel changes—in the smaller vessels, arteriosclerosis, and in the larger vessels, athero-

sclerosis. These vessel changes cause most of the subsequent pathology in the various "vital" organs. These changes may be all over or limited in some to only the kidneys, in others to the brain, in others to the coronary vessels of the heart, in others to the large vessels like the aorta, etc. The heart, however, may suffer not only from the effect of coronary vascular changes, but also from hypertrophy, especially of the left ventricle, due to high pressure. This hypertrophy takes place without any noticeable change in the number of capillaries of the heart muscle so that this muscle now has a decreased amount of oxygen diffusion throughout, and often undergoes corresponding degeneration. The mortality from malignant nephrosclerosis and cerebral hemorrhage, which may occur at any time due to unpredictable variations in pressure, is not nearly as frequent as the mortality from heart failure resulting from long standing hypertension.

ANATOMICAL AND PHYSIOLOGICAL DATA

From etiology and pathology it occurred to me that the anatomical and histological structure of the component parts of the vascular system, particularly of the arteries and arterioles must play a major role in this disease. The aorta and the main vessels arising from it are composed principally of elastic tissue with relatively scanty muscular elements, which well serve the needs of such main distributing channels, because of the resultant elastic rebound which maintains pressure within the large vessels during cardiac diastole. As the arteries bifurcate and become smaller there is marked increase of muscular tissue. These smaller vessels by varying their caliber, regulate the distribution of blood to parts as required. The arterioles, or the terminal branches of the arteries, are controlled by vasomotor fibers from the centers in the spinal cord and medulla and here the muscular elements are thought to play the major role in the controlling of blood pressure. The arterioles divide again into smaller vessels, the precapillaries, where the elastic and muscular fibers apparently disappear and pass through into the true capillaries which are made up of a single layer of endothelium. All evidence points against the ability of the capillaries to change their caliber, so that if they could be dilated sufficiently to be stretched their capacity for blood could be greatly increased—in fact, they could become what one might term "blood lakes." The venules are the beginning of the collecting system, which, when they reach a diameter of more than one millimeter, are found to have endothelial folds or valve-like structures. The veins have thinner walls, but are proportionately larger in their total diameter than the arteries until they reach the main venous trunks. The veins, therefore, because of their thinner and dilatable walls, also can be stretched to carry a greater volume of blood. To understand the principle of my mechano-therapy and its enormous possibilities for lowering blood pressure rapidly, one need only bear in mind the great

amount of blood which can be contained in the dilated capillary portions of the circulatory system, as well as in dilated veins.

The possibilities of mechano-therapy for hypertension were brought to my particular attention when using relatively small needles for phlebotomy in hypertension. I used a sphygmomanometer with the cuff inflated between systolic and diastolic pressures at a level above the point of phlebotomy. I found that the fall of blood pressure following such treatment seemed greater, in proportion, to the length of time it took to complete the treatment and the resultant proportional amount of vascular engorgement, than it did to the relative amount of blood actually withdrawn. Applying the cuff to an extremity for five to fifteen minutes in a series of cases in a similar manner, without doing phlebotomy, I found a marked engorgement and marked measurable swelling of the extremity. By immersing the extremity engorged before and after treatment in a container of water, the amount of water displaced was found to vary from 200 cc. before to 700 cc. after engorgement. This engorgement that followed treatment did not disappear in some cases for a number of days. The blood pressure after treatment was found to continue to fall in some cases up to two or three days. This lower pressure following treatment lasted from a few days in some to over a month in others. Some cases of hypertension were found to have a lowered pressure lasting even over a year.

Kountz and his associates report the use of tourniquets instead of phlebotomy as a life-saving measure in cases of acute myocardial dyspnea for a rapid lowering of venous pressure. He reported dramatic relief of symptoms through the use of pneumatic tourniquets to the extremities, thus utilizing the peripheral venous system as a reservoir to decrease the circulatory blood volume. These authors studied the effect of peripheral venous congestion in normal persons and in a group with heart disease, by means of an instrument which inflated and deflated cuffs placed on the arms and thighs in rotation. The technic, as employed by Dr. Kountz and his associates, did not produce any change in the arterial pressure—the object being to relieve the work of the heart—not to engorge or dilate the vessels of the extremities. Dr. Kountz advised his treatment for use only in the treatment of acute myocardial infarction and paroxysmal cardiac dyspnea, and not for hypertension. The work as conducted by me employs a pneumatic cuff in connection with the sphygmomanometer, and the technic of its employment and the purpose differs from that employed by Kountz and his associates in that I not only temporarily lower venous pressure but also definitely lower arterial pressure as well, by engorging and dilating the peripheral vascular tree of the extremity, using a pressure which permits the flow of blood into the extremity but prevents its return. I have found nothing in the literature that remotely resembles my treatment of mechano-therapy for hypertension.

It is interesting to note that there has been found to be a step-like rise in both the mean systolic and diastolic blood pressure of both sexes with the ponderable

index. In every age group, hypertensive individuals (except women over 60) more often are overweight than underweight. Thus it has been found that by the reduction of weight we have to date the most successful means of reducing blood pressure. This certainly suggests that the vascular bed is crowded by fat compressed between it and a relatively inelastic skin increasing the blood pressure. For that reason dietary measures which all tend to decrease weight probably lead the field today as measures for control of blood pressure.

TREATMENT OF HYPERTENSION

Treatment of high blood pressure, except when definite etiology, such as a pheochromocytoma, can be found and removed, has been for the most part unsatisfactory. Sedatives, correction of eating and resting habits, drugs for dilating the veins, sulfocynates, and surgery, including phlebotomy, section of the splanchnic nerves, and sympathectomy, all have enjoyed a certain amount of success and have made hypertension relatively compatible with longevity. What I propose in this paper is an adjuvant measure which is immediate in its action, simple to administer, and can be given without danger in any type of a case of hypertension. The measure can be used either alone or with other accepted forms of therapy and for this reason it may be tried and discontinued without in any way interfering with other treatment.

TECHNIC OF MECHANO-THERAPY

The only instrument necessary to give mechano-therapy for hypertension is a sphygmomanometer (regular blood pressure machine). The systolic and diastolic pressure are first determined. The cuff is then inflated above the elbow or above the knee of an extremity and the pressure raised midway between systolic and diastolic pressure or just above diastolic pressure. The pressure is maintained at this level for from three to five minutes or longer until the patient complains of discomfort, when the cuff is transferred to another extremity and the process repeated. The cuff may be applied on two or more extremities, after which the cuff is reapplied on the first extremity and the series repeated two or three times. The total time of treatment should not exceed twenty to thirty minutes, depending on the rate of fall of blood pressure. A fall of blood pressure greater than 60 millimeters mercury systolic frequently causes marked dizziness and discomfort so that the treatment is cut short when the fall of pressure approaches 50 millimeters mercury, in ambulatory patients. It was found that the fall of pressure following the first treatment may last only from a few hours to two or three days so that the first five or six treatments have been given daily or every other day in very marked hypertension. Although it has been found impossible to get ambulatory patients who have employment to report that often, even giving these patients treatments at intervals of one week has been sufficient to obtain excellent results when combined with other forms of therapy.

To date no untoward symptoms have been encountered from this therapy in over one thousand patients upon whom the treatment has been tried. Almost all have noted marked immediate symptomatic relief following

treatment and when used in connection with other therapy seemed to feel the result of using mechano-therapy enhanced the rapidity of action. When the patients have shown symptoms of secondary visceral involvement, such drug therapy as may relieve any pathologic impediment has always been given. It might be noted that a few patients object to the discomfort of applying a tight band on their arm for from three to ten minutes and become very nervous. In these patients it is advisable to give a shorter and more frequent application of the cuff to each extremity. Even when these patients show an immediate rise of pressure for the first five or ten minutes after treatment due to excitement, in ten minutes to one-half hour there is a marked fall in blood pressure. It has also been noted that some patients although greatly benefited by the treatments may often have a recurrence of hypertension in from one week to several months following prolonged nervous excitement or arduous physical work, but even these patients note a marked increased capacity for activity following mechano-therapy.

RESULTS EXPERIENCED WITH MECHANO-THERAPY

Mechano-therapy has now been used successfully in more than one thousand cases treated by me in the Quisling Clinic, at Madison, Wisconsin. It is thought that perhaps a few illustrative cases might be of interest to show what might be expected in a small variety of cases. I have chosen six cases, two treated by me using ordinary measures for a number of years without mechano-therapy and subsequently treated by mechano-therapy, two relatively mild cases treated for only a short time, and two advanced cases treated over a longer time.

Mrs. B. B., age 83, complained of headaches, shortness of breath, and dizziness. She has been under treatment for high blood pressure and myocarditis since 1927, at which time her blood pressure was 225/120, and had been approximately unchanged using ordinary measures of rest, diet, sedatives, digitalis, nitrites, and symptomatic therapy. In 1939 mechano-therapy was instituted with marked symptomatic relief and it was also found possible to dispense with most or much of the drug therapy. A list of blood pressures follows:

Date	B.P. Before Treatment	Treatment	B.P. After Treatment
Feb. 10, 1927	225/120	Symptomatic	
May 10, 1930	230/125	Symptomatic	
April 4, 1935	230/120	Symptomatic	
Nov. 2, 1939	240/120	Mechano-therapy	190/110
Nov. 10, 1939	200/110	Mechano-therapy	180/105
Jan. 9, 1940	290/120	Mechano-therapy	200/100
May 12, 1941	245/120	Mechano-therapy	190/120
Sept. 6, 1941	302/140	Mechano-therapy	220/110
Jan. 24, 1942	270/110	Mechano-therapy	180/90
Oct. 7, 1942	250/110	Mechano-therapy	180/90
Jan. 17, 1943	255/130	Mechano-therapy	190/110
Feb. 2, 1943	290/180	Mechano-therapy	210/120
Feb. 17, 1943	265/130	Mechano-therapy	210/120
March 8, 1943	255/130	Mechano-therapy	180/110
March 27, 1943	245/130	Mechano-therapy	160/100
May 28, 1943	225/120	Mechano-therapy	195/100
Oct. 21, 1943	220/110	Mechano-therapy	185/100
April 18, 1944	235/120	Mechano-therapy	190/100
May 10, 1944	220/115	Mechano-therapy	185/100

This patient reported only when she felt physically very ill. The intervals represent periods when she felt

well and took little if any medicine. Previous to mechano-therapy she was taking medication constantly. The patient is still living and reports for treatment about every two or three months when she begins to notice dyspnea and headaches.

Mrs. W. A., age 56, complained of shortness of breath and dizziness and was found to be suffering from myocarditis, aortic valvular heart lesion, and apparent long standing hypertension. Following is a list of her blood pressures and the results of her treatments:

Date	B.P. Before Treatment	Treatment	B.P. After Treatment
Sept. 28, 1938	184/110	Symptomatic	
Dec. 9, 1939	185/110	Symptomatic	
March 25, 1940	196/110	Symptomatic	
July 15, 1941	205/120	Symptomatic	
Sept. 1, 1942	195/118	Symptomatic	
March 28, 1943	190/116	Mechano-therapy	160/90
April 5, 1943	165/100	None	
April 28, 1943	165/98	None	
May 20, 1943	175/90	Mechano-therapy	155/85
June 7, 1943	165/90	None	
June 11, 1943	160/90	None	
June 14, 1943	158/98	None	
June 17, 1943	155/90	None	
July 1, 1943	150/90	None	
July 19, 1943	162/90	None	
July 30, 1943	155/90	None	
Aug. 21, 1943	172/90	Mechano-therapy	150/90
Sept. 8, 1943	162/90	None	
Nov. 8, 1943	170/100	Mechano-therapy	160/90
Jan. 24, 1944	164/90	None	
April 21, 1944	170/90	None	

This case shows how a relatively normal blood pressure may be maintained over a period of time by occasionally checking the blood pressure and applying mechano-therapy when indicated. Note the patient had been treated by other measures previously with much inferior results.

Mr. A. B., age 42, a farmer, complained of shortness of breath, tired, and no pep. His blood pressure and treatments were as follows:

Date	B.P. Before Treatment	Treatment	B.P. After Treatment
Oct. 20, 1941	160/85	None	
Oct. 23, 1943	212/140	Mechano-therapy	160/110
Nov. 4, 1943	170/120	Mechano-therapy	140/100
Nov. 7, 1943	162/120	Mechano-therapy	140/100
Nov. 14, 1943	140/105	None	
Dec. 12, 1943	152/100	None	
Dec. 19, 1943	150/95	None	
Feb. 4, 1944	152/98	None	

The physical findings in this patient were all negative. Patient was thought to suffer with early essential hypertension because he had been to the clinic about a year previous when his blood pressure was normal. The symptomatic relief as well as the apparent fall in blood pressure were characteristic of findings in a number of cases of early hypertension and this case is cited as an example. The fact that the pressure remained down over a period of time without further treatment is also worthy of note.

Mrs. T. R., age 64, came into my office on April 2, 1943, complaining of dyspnea. Examination revealed no significant physical findings except a blood pressure of 206/120. This was thought to be an early case of essential hypertension because she had been examined two

years previous and at that time her pressure was within normal limits. The following is a list of her treatments and results:

Date	B.P. Before Treatment	Treatment	B.P. After Treatment
April 1, 1941	160/100	Symptomatic	
April 2, 1943	206/120	Mechano-therapy	180/100
April 9, 1943	172/100	Mechano-therapy	148/90
April 21, 1943	155/90	Mechano-therapy	135/80
April 30, 1943	135/90	None	
May 13, 1943	150/85	None	
May 21, 1943	145/85	None	
June 3, 1943	140/90	None	
June 21, 1943	140/90	None	
June 30, 1943	135/85	None	
July 16, 1943	140/90	None	
Aug. 25, 1943	142/95	None	
Oct. 20, 1943	158/90	None	
Nov. 17, 1943	175/100	Mechano-therapy	140/90
Nov. 26, 1943	140/90	None	
Dec. 3, 1943	143/90	None	
Feb. 14, 1944	190/100	Mechano-therapy	165/90
May 11, 1944	155/90	None	

It is to be noted that the pressure responded rapidly to mechano-therapy but that after the lapse of several months in two instances the treatment had to be repeated in order to bring the pressure back down to normal.

Mr. P. A., age 66, complained of shortness of breath and dizziness. His blood pressure was thought to be due to chronic essential hypertension, no other physical findings or clinical findings being found. His blood pressure and response to treatments was as follows:

Date	B.P. Before Treatment	Treatment	B.P. After Treatment
Oct. 20, 1936	184/110	Symptomatic	
April 7, 1938	225/155	Symptomatic	
Dec. 27, 1939	200/120	Symptomatic	
Nov. 8, 1940	180/125	Symptomatic	
Nov. 26, 1941	191/118	Symptomatic	
July 29, 1942	210/118	Symptomatic	
April 26, 1943	190/118	Mechano-therapy	150/100
May 10, 1943	190/110	Mechano-therapy	150/100
June 2, 1943	150/90	None	
June 16, 1943	158/105	Mechano-therapy	140/95
July 11, 1943	170/100	Mechano-therapy	150/90
Aug. 4, 1943	165/100	Mechano-therapy	150/90
Sept. 13, 1943	170/100	None except drug	
Oct. 27, 1943	165/100	Mechano-therapy	150/90
Jan. 11, 1944	170/105	None except drug	
May 3, 1944	174/115	None except drug	
July 6, 1944	230/140	Mechano-therapy	180/110
Aug. 10, 1944	180/110	Mechano-therapy	160/100

Note the long period of relatively lowered blood pressure following mechano-therapy. Also note how the pressure gradually rose even though the patient was taking drug therapy for hypertension without mechano-therapy. Note finally the apparent immediate effect of the addition of mechano-therapy to his regular drug therapy.

Mrs. A. M., age 57, complained of shortness of breath. Physical findings were all negative. She was diagnosed as a case of essential hypertension. The following is a list of her blood pressures and treatment:

Date	B.P. Before Treatment	Treatment	B.P. After Treatment
Dec. 5, 1939	195/135	Symptomatic	
April 23, 1942	245/140	Symptomatic	
May 12, 1942	230/130	Symptomatic	
March 8, 1943	225/125	Mechano-therapy	165/95
March 21, 1943	162/105	Mechano-therapy	154/90
Aug. 16, 1943	185/125	Mechano-therapy	170/110
Sept. 14, 1943	188/120	Mechano-therapy	165/110
Sept. 28, 1943	172/110	None except drug	
Dec. 21, 1943	205/140	Mechano-therapy	165/110
Jan. 3, 1944	170/100	Mechano-therapy	160/90
Feb. 23, 1944	205/135	Mechano-therapy	170/110
April 2, 1944	182/120	Mechano-therapy	155/110
May 9, 1944	186/120	Mechano-therapy	140/100
June 26, 1944	180/115	Mechano-therapy	150/100

This patient has been able to work at arduous labor and notes no symptoms until her blood pressure rises above 180. She will report only when discomfort makes her seek relief. She seems to obtain immediate relief which lasts for a period of several weeks to three months. It is interesting to note that when the treatments are given closer together the pressure has been considerably lower. She has been taking nitrites and sedatives more or less constantly since 1939.

DISCUSSION

Illustrative case histories of six hypertensive patients have been reviewed. Some of these show treatment and results previous to the use of mechano-therapy indicative of relatively no spectacular rises or falls. Comparison of treatment with and without mechano-therapy therefore seems to indicate marked immediate improvement and in some cases prolonged improvement due to mechano-therapy over other therapy. It has been my policy in treating hypertension to employ as little drug therapy as possible and I have found that when using mechano-therapy drugs may be reduced to a minimum and discontinued entirely in many instances. However, in some cases it has been necessary to continue medication in addition to giving mechano-therapy to maintain the patient's physical well-being, but a very marked physical and psychological improvement has been noted and the patient has often greatly outlived any possible life expectancy using mechano-therapy over any other therapy used alone. It would appear that early hypertension may be arrested at least for a long period of time and no other therapy need be given. It has been shown by experimental work that perhaps the modus operandi of mechano-therapy is the production of increased capacity for blood in the capillaries and small veins, which dilated capillaries and small veins act like vascular lakes (which may be similarly produced in the splanchnic areas when sympathetic ganglia are removed in the treatment of hypertension) and serve as buffers to hypertension. The big advantage of mechano-therapy over all other therapy is its apparent freedom from danger of secondary complications.

CONCLUSIONS

1. A simple mechanical means for rapidly reducing blood pressure, using a sphygmomanometer has been described, which means may be used alone or as an adjunct to other therapy.

2. Experimental data would seem to prove that the *modus operandi* of mechano-therapy for reduction of blood pressure appears to be due to the mechanical stretching of the capillaries and small veins which then act as vascular lakes and hence as buffers to hypertension.

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Book Reviews

Secretory Mechanism of the Digestive Glands, by B. P. BABKIN, M.D., D.Sc., F.R.S.C. New York: Paul B. Hoeber, Inc. 920 pages with indices and 220 illustrations. 1944. \$12.75.

This volume covers the work done during the last 14 years in the department of physiology at McGill university, Montreal, on the secretory activity of the digestive glands and particularly the function of the gastric, salivary and pancreatic glands. Professor Babkin describes the mechanisms involved in the regulation of the secretory activity of the principal digestive glands under normal conditions and thus lays the foundation for the understanding of abnormal reactions due to disease of the organs concerned.

The glandular organs of the stomach and pancreas particularly are complicated in structure and arrangement. Stimuli which activate the components of the complicated system of digestive glands are seldom single or direct, but comprise inter-related nervous, hormonal and enzymatic elements. To unravel and clarify the complex operations requires knowledge of physics, chemistry and histology. Such universal comprehensive understanding is marshalled by physiologist Babkin in his encyclopedic discussion. Babkin has been investigating digestive secretions for forty years. The present volume is complementary and supplementary to the work published in German nearly twenty years ago. And yet the author modestly states in the opening paragraph that "the work is still in the initial steps and far from complete," and that "attempts to explain the mechanism by which the digestive glands are set into activity and by which their activity is regulated, will, of necessity be imperfect." With which the author launches upon 778 pages of text, and adds 85 pages of references and 35 pages of author-and-subject index.

Withal, Babkin follows the lines laid out in his previous book, and deals with the external secretions of the digestive glands, that is, those elements which are discharged into the alimentary canal but considers more than casually the internal secretions which are functionally related. After setting forth all of the theories advanced to explain variation in constituent elements of the gastric juice, Babkin elaborates his often stated view that variations in the secretion of the different gastric epithelia which participate in the formation of the gastric juice, determine the character of the composite secretion. That is, the final composition of gastric juice at any particular time depends upon the functional capacity and activity of the individ-

ual secretory structures, and is not the result simply of quantitative chemical reactions.

With all its erudition, the book should supply the practicing gastroenterologist with data by which many normal and abnormal phenomena constantly observed in human patients may be explained.

The book is adequately illustrated and in every way conforms to the perfect format expected of Hoeber publications.

Allergy in Practice, by SAMUEL L. FEINBERG, M.D., Associate Professor of Medicine and Chief of the Division of Allergy, Northwestern University Medical School. Chicago: The Year Book Publishers, Inc.; 798 pages illustrated, with table and index; 1944; price \$8.

Many books have been written on the subject of allergy; some have been most interesting because they have elaborated on the history of the treatment of allergic diseases; others have emphasized the symptomatology and diagnosis of allergy, and a few have extended themselves on the treatment of allergic conditions. The author of this book has struck a happy medium between all the phases of an allergic workup. He gives just enough information to introduce an allergic disease, just enough help to make it practical to diagnose allergy, and finally he tries very conscientiously to evaluate the various forms of treatment. The latter is a very difficult thing to do. There always has been a tendency for writers to go back and more or less summarize the work of others, but in this book the author weaves in his own observations. Since he has been successful in the practice of allergy and knows that it is important to be practical, his observations are very much worth while. Therefore, this book on allergy is highly recommended.

Synopsis of Diseases of the Heart and Arteries, by GEORGE R. HERRMANN, M.D. St. Louis: C. V. Mosby Co.; 516 pages with 103 text illustrations and 4 color plates. 1944. Price, \$5.00.

The third revised edition of this book should be welcomed by physicians in general practice who, during these strenuous times, do not have the time to page over large and exhaustive texts.

The subjects are presented in a concise, logical manner. Four new chapters have been added for such subjects as Nervous Disorders with Cardiac Manifestations, Blood Pressure Abnormalities, Essential Hypertension and General Systemic Types of Heart Disease.

All material has been brought up to date and new material on war medical literature has been added.

This book should prove very useful to students and practitioners alike.

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MEDICAL PROBLEMS ON THE HOME FRONT

It has been variously estimated that thirty-five to forty per cent of the physicians of our country are in the armed forces at the present time. Figures change from time to time and it would not be possible to give the exact numbers as of this reading. We have been unofficially informed, however, that approximately sixty thousand physicians are now with the colors. On November 1, 1944, an item appeared in the public press indicating that the Army had reached its complement of medical officers but that the Navy is in need of additional personnel.

The ratio from the North Central States seems to run true to the national estimate. Conservative figures place the present Minneapolis quota at three hundred fifty. Hospitals have been wellnigh depleted of senior interns and the responsibility to assist in surgery has fallen upon the surgical nurse. Intravenous medications must be administered by the attending physicians except in the

simpler cases where the head nurse may be entrusted with this practice. Nasal suction is started by the head nurse or her assistant, and laboratory technicians begin the administration of blood in transfusion cases. Newly graduating M.D.s are automatically commissioned in the Medical Corps, which is as it should be; and now we come to a consideration of the problems that confront those who remain to serve on the home front. Many of these physicians are hale, and happy at the thought of being wanted and permitted to serve beyond the accustomed years of retirement, but even they are showing signs of breaking down from overwork.

No definite rule has been laid down, no edict has gone forth from some overlord that regiments and dictates the hours of service of the members of our profession, thank God, but an understanding exists that house calls can only be made in the more urgent cases. All patients who can be expected to cooperate by coming to the doctors' offices.

A. E. H.

THE SILVER LINING TO WAR

The sound and fury of the recent presidential campaign must have penetrated every household in the U. S. A., but it had no effect whatever on the march of death and medical progress. Dr. Lyell C. Kinney, newly elected president of the American Roentgen Ray Society, stated in his inaugural address that medical science, stimulated by war-time necessity, will save more lives in the next few months than have been lost in the entire war.

Into the editorial office of the JOURNAL-LANCET come daily "releases" from the Surgeon General's Technical Information Division, from the American Hospital Association, from the U. S. Chamber of Commerce, U. S. Senate Reports on public health hearings and many others, all setting forth new miracles in surgery, chemotherapy, psychiatry, physical therapy, new methods of diagnosis and treatment, new experiments in nutrition—all pointing to the coming brave new world in medicine that promises far more drama than even the new radios, television, refrigerators, of which the commentators and advertisers prattle so eloquently. Some of these may have escaped your attention so here are a few samples taken at random that have come our way in recent weeks:

The new treatment of penetrating chest wounds is focussed on restoration of full lung function rather than mere prevention of empyema. In the Italian campaign out of 320 men admitted to one general hospital only two deaths were directly attributable to chest wounds and only 54 developed empyema.

In one of the largest hospitals in the world (San Diego) the Navy has been treating burns with salt water as the result of the findings as to its effectiveness during the evacuation at Dunkerque. In this hospital this salt water treatment has entirely superseded the use of tannic acid and petrolatum, and one of its advantages is that it makes successful skin-grafting far easier.

The Navy has adopted a long term program for controlling streptococcal infections of which one of the most important steps is mass prophylaxis with sulfadiazine. Daily doses (1 gram) were given 250,000 naval trainees with dramatic results. In an untreated group streptococcus infections were 24 times that of the treated.

Almost every day someone discovers a new use for penicillin. Recently it has been found to speed up the healing of big skin grafts amazingly. And very recently by its use it has been found that the cure of gonorrhea can be speeded up to a 9 A.M. to 4:20 P.M. schedule.

Healing of old infected wounds, burns, varicose ulcers, etc., can be shortened by months with the use of a paste from red blood cells (made by mixing red blood concentrate with a jelly of tragacanth and hexylresorcinol).

Sodium amytal is widely used these days by army psychiatrists as a new kind of hypnotism. The drug causes the men to disclose the conflicts behind the mental breakdown and makes them susceptible to suggestion.

The malarial rate has been cut 95 per cent by the Army. Low-flying A-20 Havocs combat the mosquitoes with dust insecticide, flying as low as 20 to 30 feet. That atabrine has proved as good and even better than quinine is the statement recently released by the Board of Co-

ordination of Malarial Studies through the National Research Council at Washington.

Perhaps that is enough to suggest the possibilities of the medical wave of the future. If you have seen the moving picture "Wilson" you remember how the tanks of World War I looked like baby-carriages compared with those of this war. Even more startling is a comparison of the treatment given our fighting men in the two wars. Given enough time maybe man, so brilliantly inventive and imaginative in science, may even learn to live with his fellow men without the wholesale murder that is war. In the meantime, however, if there is a silver lining to war it is to be found in the research laboratories of medicine.

M. S. U.

Necrology

Dr. B. F. Markin, 65, Columbia, South Dakota, died October 7, from a heart attack suffered while on a hunting trip. Dr. Markin had been a resident of Columbia for 44 years and was the oldest doctor in point of service in Brown county.

Dr. Charles MacLachlan, 83, New Rockford, North Dakota, died October 7 after a long illness. Dr. MacLachlan was born in Ontario, Canada, and was a graduate of the University of Toronto. He had been a member of many state organizations, served on the first state board of medical examiners, a member of the state legislature, of the state board of health, and had held many other offices in his long career. He came to New Rockford in 1889.

Dr. E. J. Wilcox, 50, Drummond, Montana, died October 11, at his new home in Missoula where he had gone to be under medical attention. Dr. Wilcox served with the army in France in World War I, and received his medical degree in 1924.

Dr. William H. Porter, 71, Calvin, North Dakota, died October 15, at a Devils Lake hospital. Dr. Porter was well known throughout the state for his long service as state senator, and he always gave much of his time and thought to educational and community social problems. In addition to practicing for almost 40 years he operated a drug store.

Dr. F. V. Willhite, 66, Redfield, South Dakota, died at his home October 20 after a long illness. Dr. Willhite served at the Yankton state hospital for 14 years after which he accepted the superintendency of the State School and Home at Redfield.

Dr. P. J. Griffin, Fertile, Minnesota, died October 15, following a short illness in the Veterans' hospital, Fargo, North Dakota. Dr. Griffin served in World War I, served as state food bacteriologist in the Chicago health department, and on the staff of the Hines Hospital for Veterans in that city. He was a member of the American, Minnesota and Red River Valley medical associations.

News Items

Dr. H. H. Brauer of Grafton, North Dakota, has moved to Sisseton where he will be associated with Dr. Younker. Dr. Brauer specializes in x-ray and internal medicine.

Dr. E. Adams has moved from Rochester, New York, to become associated with the Great Falls (Montana) clinic of pediatrics. Dr. Adams was chief resident pediatrician and instructor in pediatrics of Strong Memorial hospital in Rochester where he also interned.

Dr. Sidney Miller, fellow in medicine in the Mayo Foundation, has been ordered to active duty as a first lieutenant in the army medical corps. Dr. Miller was graduated from Johns Hopkins medical school in 1940.

Dr. Norman Wagner, who has served with the U. S. Coast Guard since his graduation from the University of Iowa in 1940, has joined the staff of the Oliver Clinic in Graceville, Minnesota.

Dr. Peter D. Ward, superintendent of Charles T. Miller hospital, St. Paul, was named president-elect of the American Hospital Association at the organization's annual convention in Cleveland.

Dr. Charles Irwin of Heart Mountain, Wyoming, has resigned his position as chief medical officer of the local hospital to join the Billings clinic, Billings, Mont.

The sixth district medical society of South Dakota held a meeting at St. Joseph's hospital at Mitchell October 16. Dr. A. F. O'Donoghue of Sioux City, Iowa, presented an interesting paper, "Semi-delayed Union of Fractures of the Hip."

The October meeting of the Grand Forks, North Dakota, district medical society was held at the University of North Dakota. Dr. Melvin Koons, director of public health laboratories at the university, gave a summary of the plasma work at the university. The proposed four year medical school at the University was discussed and the society went on record in favor of "increased medical facilities at the University of North Dakota looking to the establishment of a four year medical school."

Dr. Stanley R. Maxeiner, Minneapolis, attended the Western Surgical Association meeting in Chicago on December 1st and 2nd and gave a paper entitled, "Islet-Cell Tumors of the Pancreas" in collaboration with Lt. Col. Harry E. Bundy, United States Veterans Administration, Minneapolis.

Susan Holmes, superintendent of Abbott hospital, Minneapolis, since the year after it was established, 43 years ago, will retire and take up her residence in Milwaukee. She is succeeded by Miss Ethel Wise.

Dr. E. P. Christenson, head of the hospital in Two Harbors, Minnesota, has retired after serving that community for 37 years, and has gone to Los Angeles to establish a home there.

Dr. J. J. Morrow, after many years of practice in Austin, Minnesota, has left that city to make his home on the Pacific coast.

Dr. Daniel C. Gates has been appointed by Dr. E. J. Hill, Minneapolis city health director, director of health education, one of the three positions newly created by Dr. Hill.

The War Labor Board has recently granted permission to the Community Hospital Association of Princeton, Minnesota, to erect a \$75,000 hospital.

Lieutenant-Colonel James R. Dillard, a Fargo (N. D.) physician, has recently returned home after 32 months in Australia and New Guinea. He has come through 39 Japanese bomb raids. He is enthusiastic in his praise of the New Guinea natives to whom he declares the Allies owe much gratitude. It is his opinion that the kindly feeling they have shown and the great assistance they have been to our men are due largely to the fine work done in medical aid and education carried on by our medical missionaries.

Dr. Herbert C. Doroshow has arrived in Pierre, South Dakota, to be resident of St. Mary's hospital of that city. Dr. Doroshow, a graduate of Johns Hopkins, has been serving as resident at Philadelphia's Jefferson hospital.

Dr. R. H. Picha, Hopkins, Minnesota, entered military service November 15. Dr. A. C. Stahr of Minneapolis has taken over his practice.

The defeat by a vote almost 3 to 1, of Initiate No. 48, by the Montana electorate on November 7, proved again that an enlightened people can be trusted to defeat any effort to lower the standards of medical practice. This bill would have given the state's osteopaths "unlimited surgical rights" and defined osteopathy as a branch of medicine with its own ruling board. The "enlightening" campaign was carried on largely by the Public Health League of Montana, organized to include not only doctors, dentists and hospital associations but prominent laymen and all organizations affiliated in any way with medicine. A campaign manager was employed, radio, newspapers, and house to house canvassing featured widely in the fight. Every voter in the state was contacted and received literature advising him of the truths of the issues. Montana laymen and its medical fraternity are to be congratulated on a fine piece of work in the interests of all its citizens.

Dr. Paul Tschetter of DeSmet, South Dakota, has taken over the practice of Dr. R. A. Buchanan, Huron, who has accepted a lieutenant commander commission in the navy. Dr. Tschetter was graduated from Johns Hopkins in 1932 and after two years in hospital and graduate work practiced in DeSmet for ten years.

Dr. Gordon B. New of the Mayo Clinic, Rochester, Minnesota, was elected president of the American Academy of Ophthalmology and Otolaryngology at its annual meeting in Chicago. Other officers include Dr. William L. Benedict of Rochester, and Dr. Erling W. Hansen of Minneapolis.

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